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APPENDIX 24

SIGNAL SORTER FLOW CHARTS

FINAL SOFTWARE REPORT

DATA ITEM NO. A005

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INTEGRATED ELECTRONIC WARFARE SYSTEM ADVANCED DEVELOPMENT MODEL (ADM)

18007877-24

PREPARED FOR

NAVAL AIR DEVELOPMENT CENTER
WARMINSTER, PENNSYLVANIA

CONTRACT N62269-75-C-0070

RAYTHEON
ELECTROMAGNETIC
SYSTEMS DIVISION

1 OCTOBER 1977

UNCLASSIFIED

APPENDIX 24

SIGNAL SORTER FLOW CHARTS
FINAL SOFTWARE REPORT

DATA ITEM A005

INTEGRATED ELECTRONIC WARFARE SYSTEM (IEWS)
ADVANCED DEVELOPMENT MODEL (ADM)

Contract No. N62269-75-C-0070

Prepared for:

Naval Air Development Center
Warminister, Pennsylvania

Prepared by:

RAYTHEON COMPANY
Electromagnetic Systems Division
6380 Hollister Avenue
Goleta, California 93017

1 OCTOBER 1977

RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS. 02173	CODE IDENT NO. 49956	SPEC NO. CG-983645-2
			SHEET 1 OF / REV

TYPE OF SPEC

Computer Program Design Specification

TITLE OF SPEC

IEWS Signal Sorter Flow Charts

FUNCTION	APPROVED	DATE	FUNCTION	APPROVED	DATE
WRITER	T. Chernesky				

REVISIONS

CHK	DESCRIPTION	REV	CHK	DESCRIPTION	REV

REVISION																							
SHEET NO.																							
REV STATUS OF SHEETS	REVISION																						
	SHEET NO.																						

10-1348 (11/68) VELLUM PRINTED IN U.S.A.
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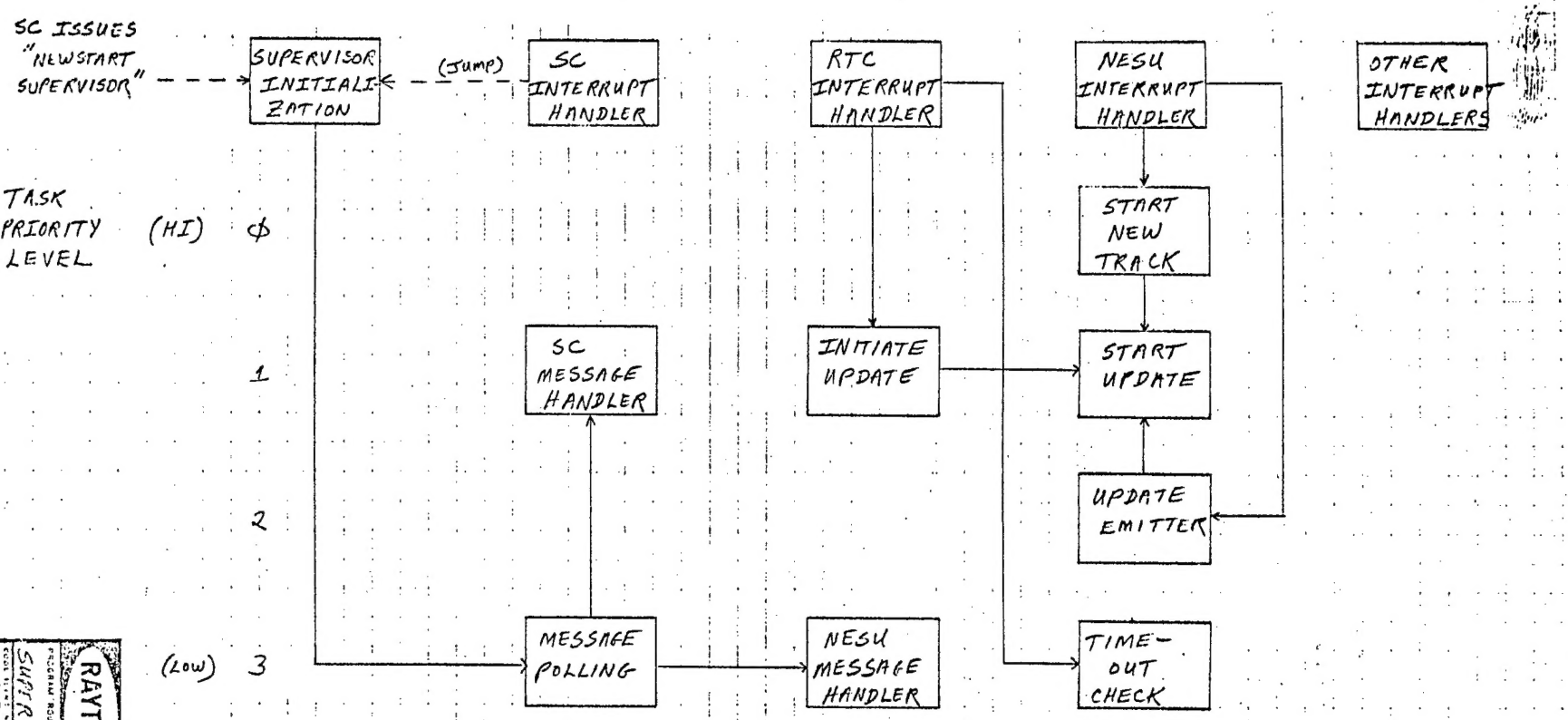


INTERRUPT PRIORITY

HIGHEST =	8	BUS HUNG	
	7	WATCHDOG TIMER EXPIRED	
	6	PANIC BUTTON	
	5	SC MESSAGE	
	4	NESU MESSAGE	
	3	REAL TIME CLOCK	
	2	IB > 3/4 FULL	
LOWEST =	1	IB < 1/4 FULL	

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM: IIUS SOKTEK SUPV

SUPERVISOR TASK SCHEDULING

ECOM ITEM NO. 49956 | PREPARED BY: T. CHERNESKY | DATE: 30 APR 76

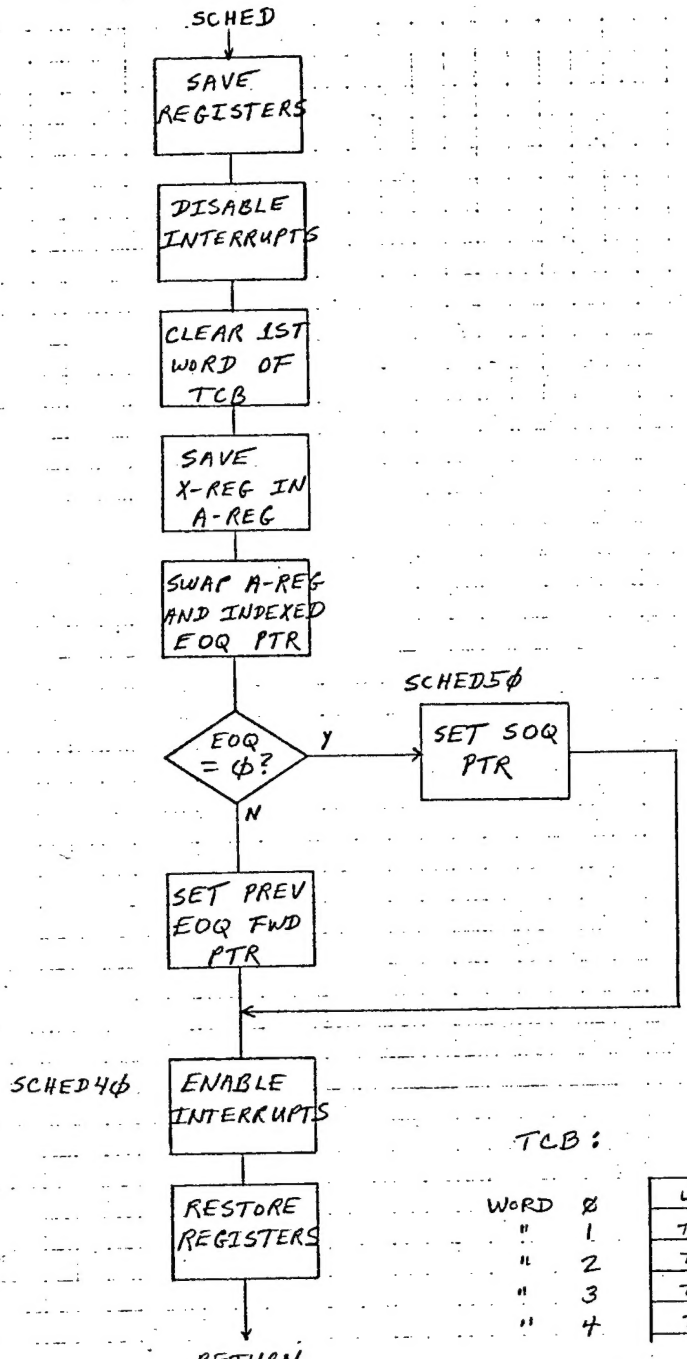
NUMBER 1 | SHEET 1 OF 1

FLOW CHART

REMARKS

0-1

FLOW CHART



TCB:

WORD ϕ	USED BY SCHED
" 1	TASK ADDRESS
" 2	TASK ARG 1
" 3	TASK ARG 2
" 4	TASK ARG 3

CALL SEQ —

LDSX (ADDR OF TCB)

LDSB (TASK PRIORITY LEVEL)

JSUB (=SCHED)

— NORMAL RETURN

REMARKS

'TCB' MEANS 'TASK CONTROL BLOCK'

INDEXING IS BY TASK PRIORITY LEVEL

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM IEWS SORTER SUPV

SCHEDULER SUBROUTINE

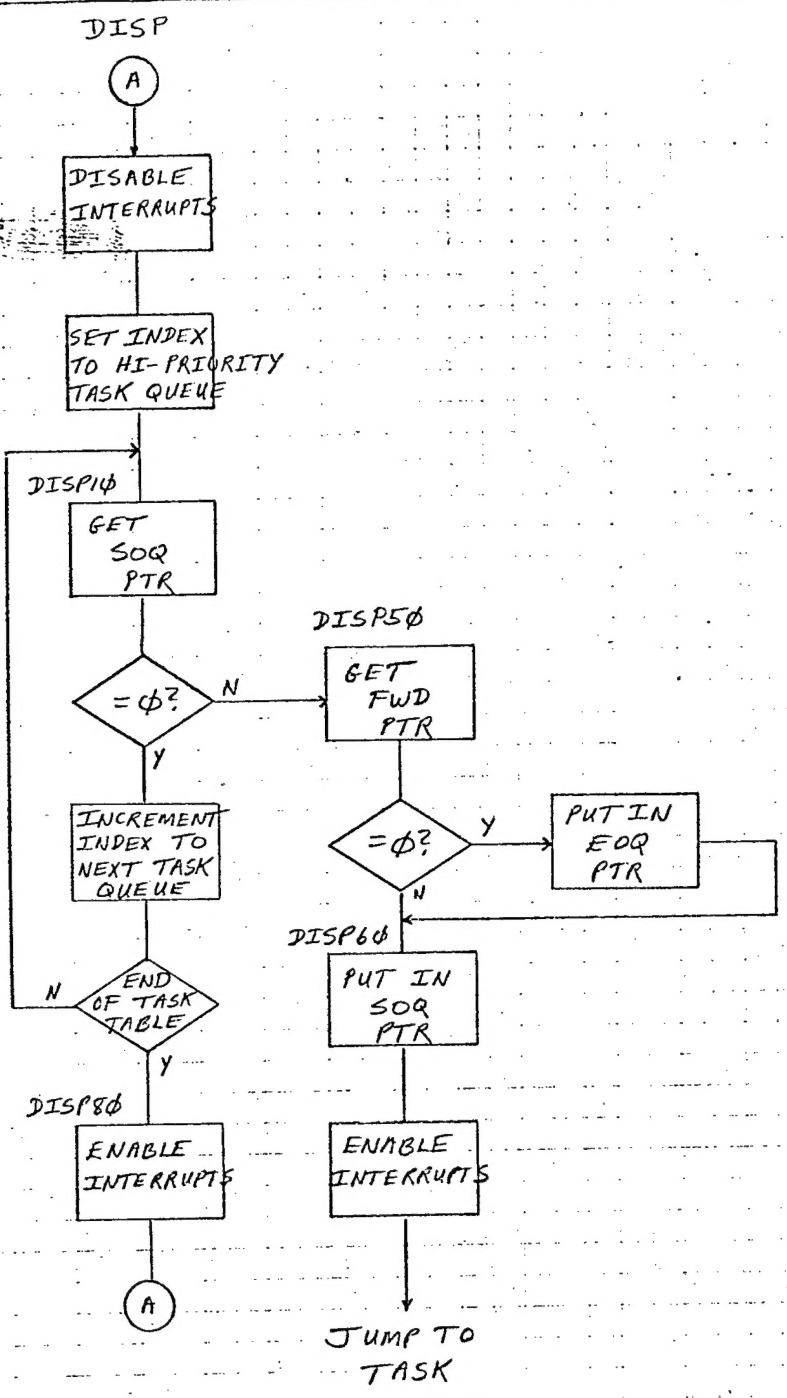
CODE IDENT. NO. 49956 | PREPARED BY T. CHERNESKY | DATE 9 APR 76

NUMBER 4 | SHEET 1 OF 1

10-2319-8 (2)

FLOW CHART

REMARKS



X-REG CONTAINS ADDR OF TASK CONTROL BLOCK

CALL SEQ —

— Jump (=DISØ)

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

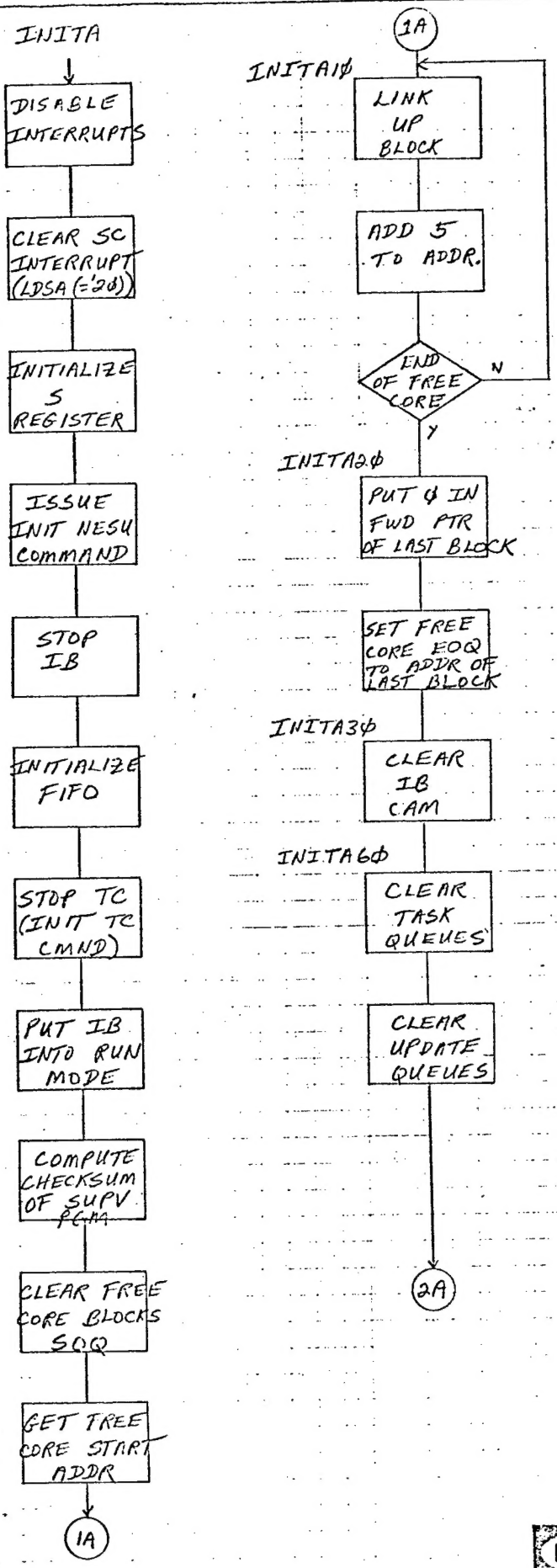
PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SUPV
DISPATCHER

CODE IDENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 9 APR 76

NUMBER 5 | SHEET 1 OF 1

FLOW CHART

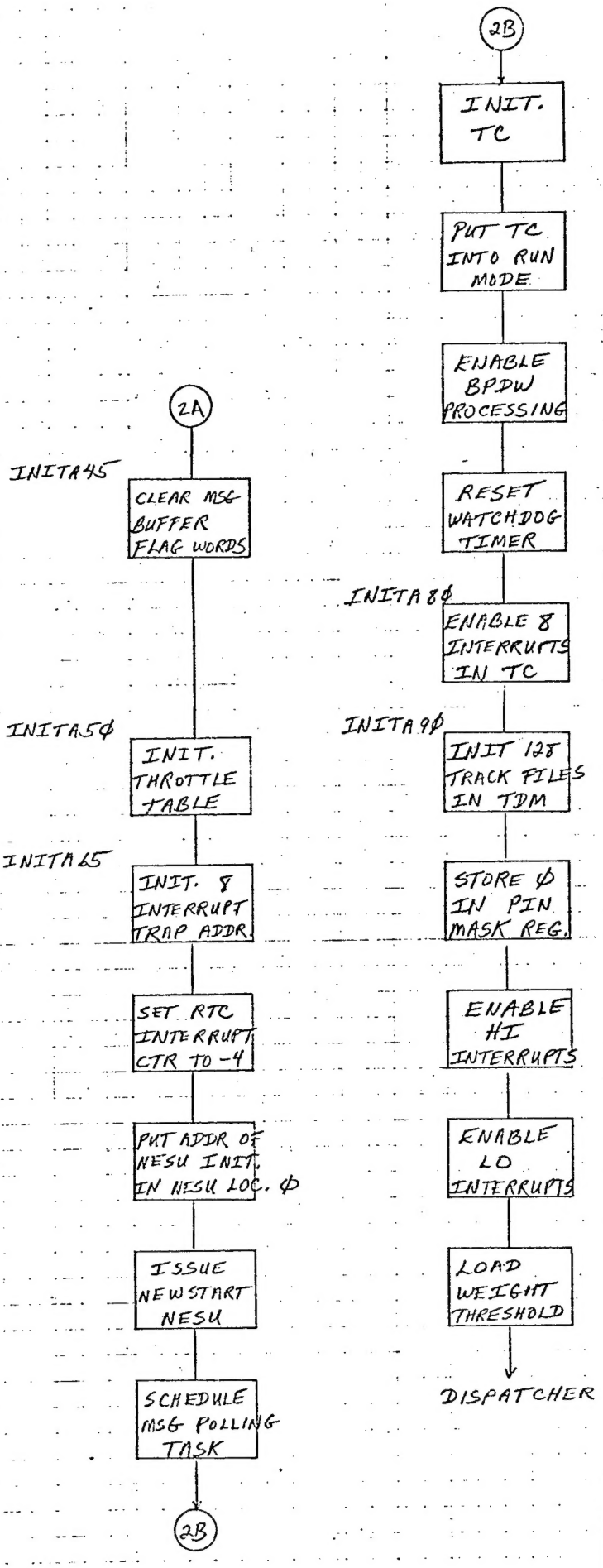
REMARKS



RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS. 02173
PROGRAM/ROUTINE/SUBROUTINE ACRONYM	IEWS SORTER SUPV
	INITIALIZATION MODULE
COMPUTER PROG. NO.	49956
PREPARED BY	T. CHERNESKY
DATE	1 JUN 76
NUMBER	6
SHEET	1 OF 2

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

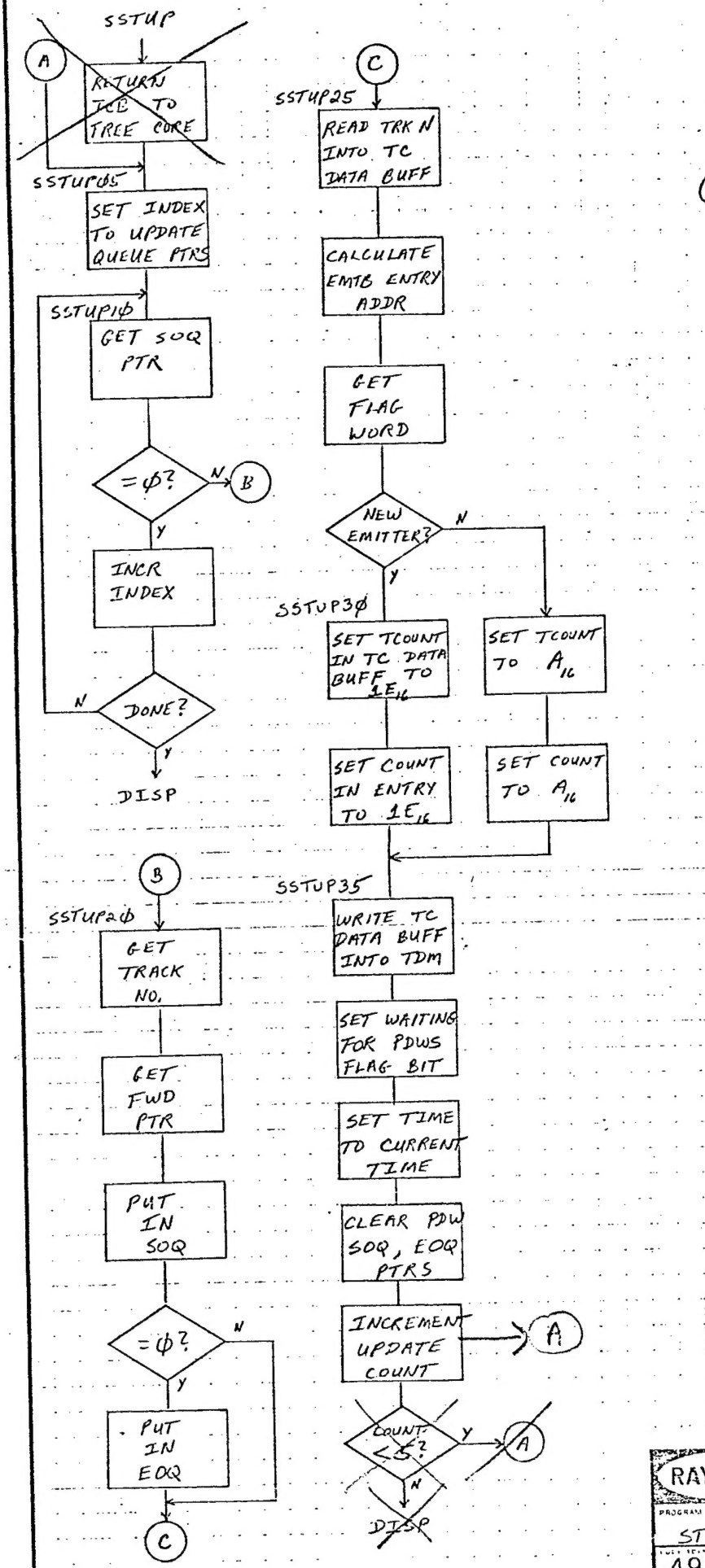
PROGRAM ROUTINE SUBROUTINE ACRONYM: IEWS SORTER SUPV

INITIALIZATION MODULE

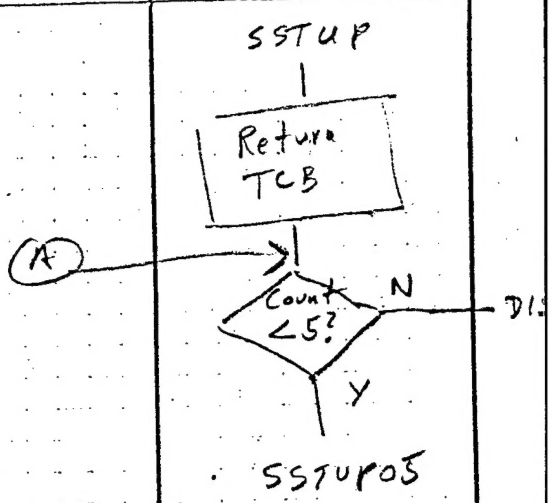
CODE IDENT. NO.	PREPARED BY	DATE
49956	T. CHERNESKY	1 JUN 76

NUMBER 7 SHEET 2 OF 2

FLOW CHART



REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS 02173

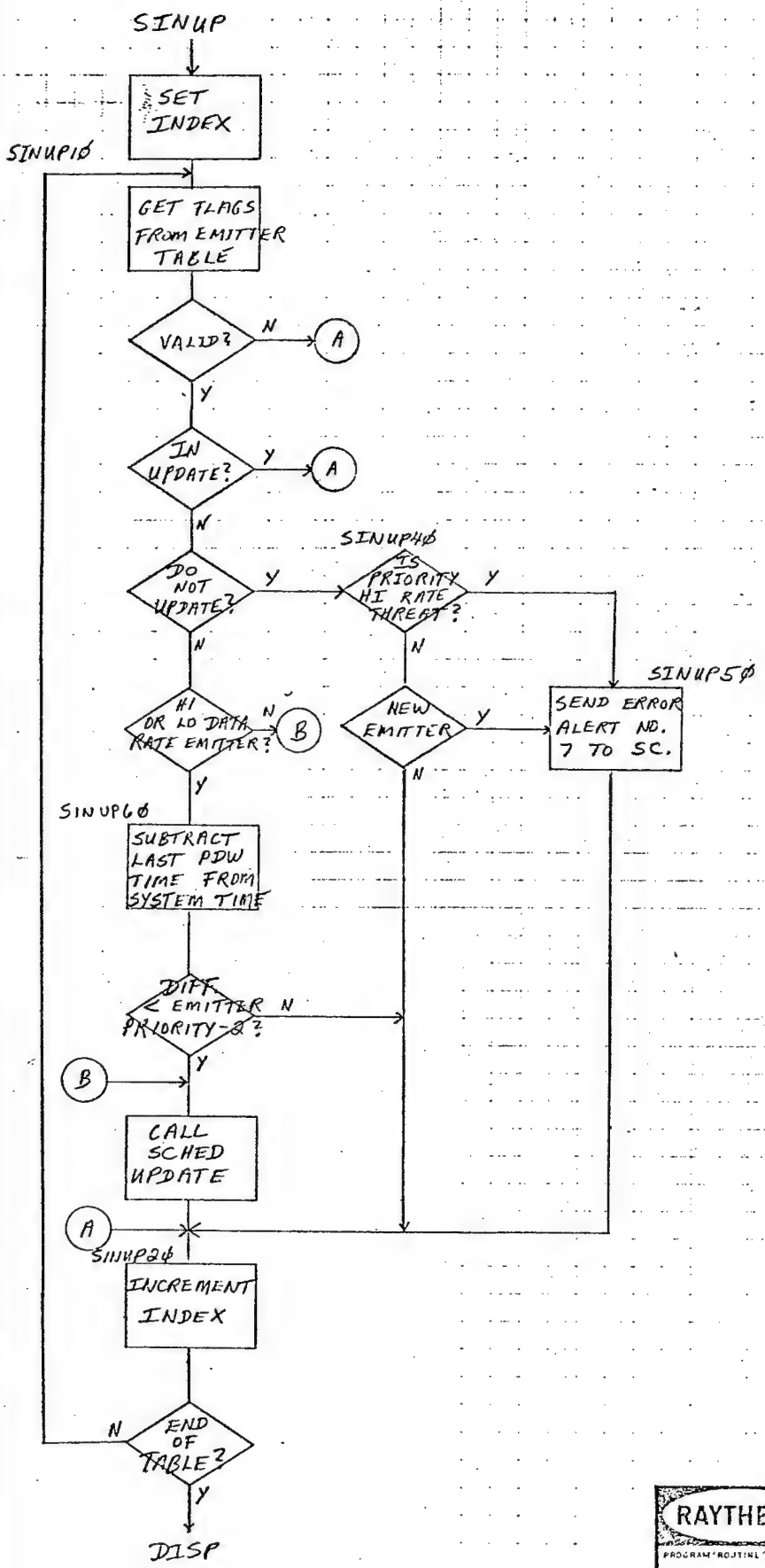
PROGRAM ROUTINE SUBROUTINE ACRONYM: ILWS SORTER SUPV

START UPDATE TASK

DOCUMENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 3 JUN 76

NUMBER 8 | SHEET 1 OF 1

FLOW CHART



REMARKS

EMITTER UPDATE INTERVALS

1 SEC
- NEW EMITTER
- HI RATE THREAT

2 SEC
- HI RATE

4 SEC
- LO RATE

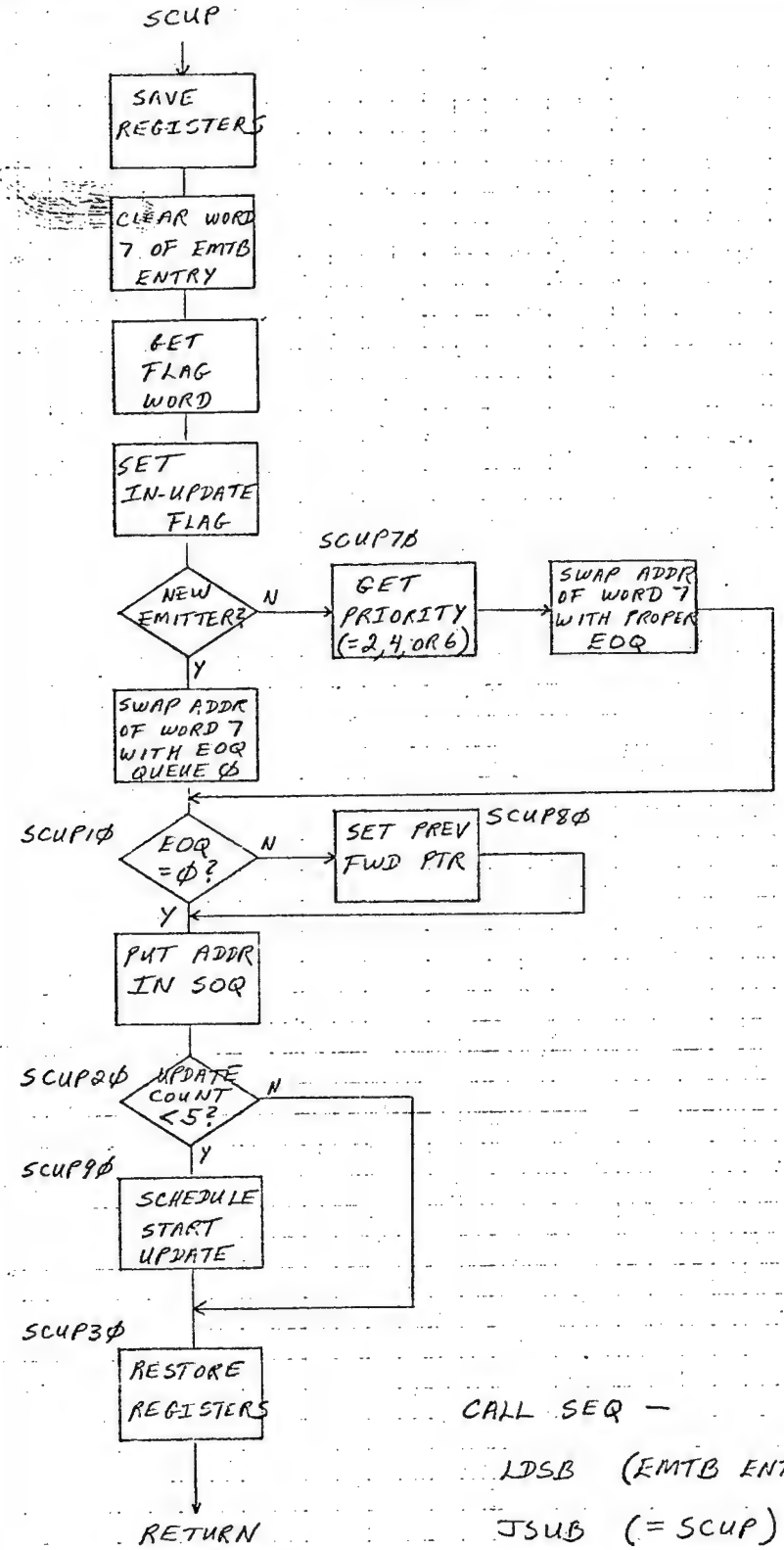
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SUPV
INITIATE UPDATE TASK

CODE IDENT NO: 49956 | PREPARED BY: T. CHCANESKY | DATE: 1 JUN 76

NUMBER: 4 | SHEET 1 OF 1

FLOW CHART



CALL SEQ —

LDSB (EMTB ENTRY ADDR)

JSUB (= SCUP)

— NORMAL RETURN

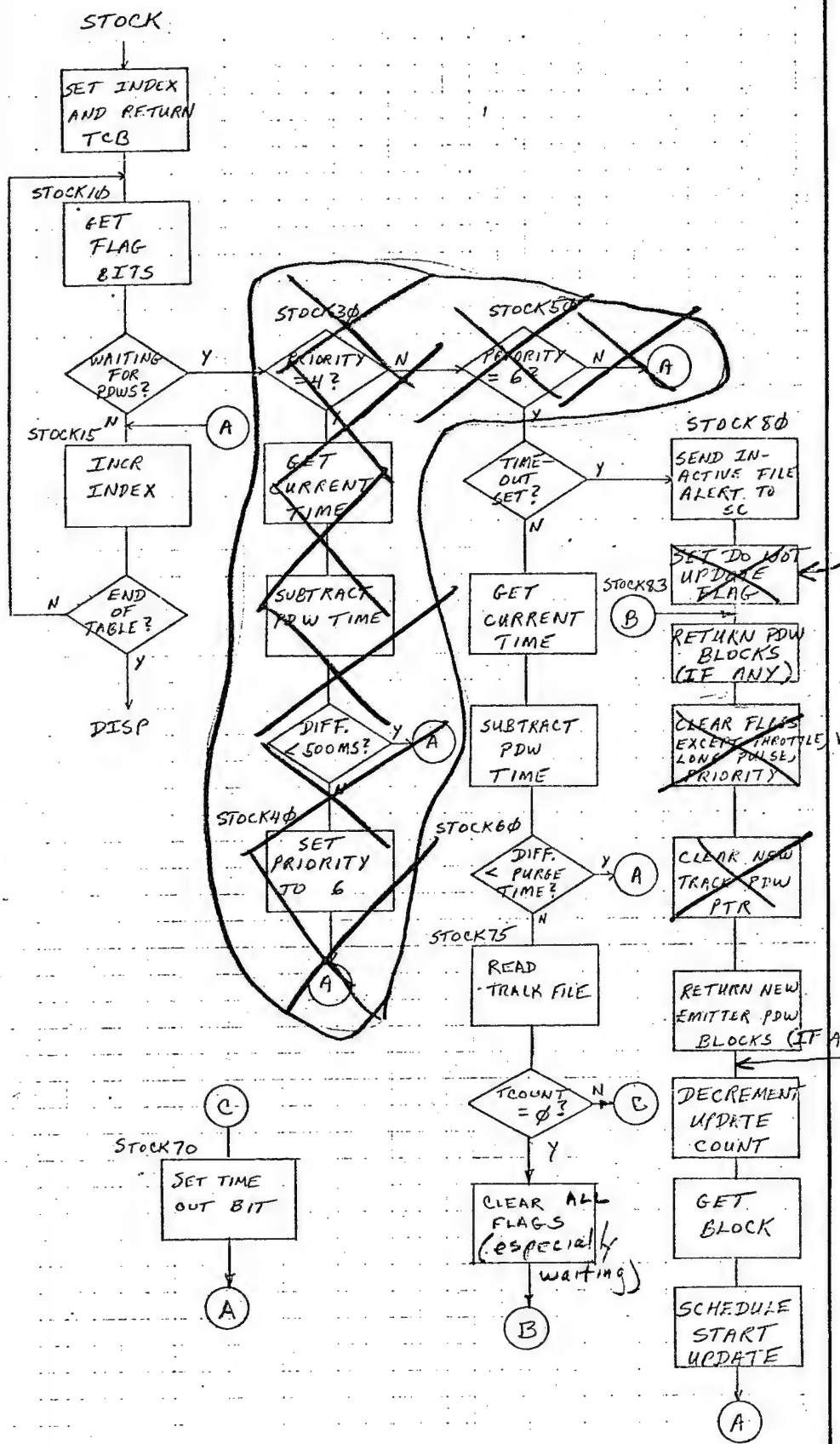
REMARKS

'EMTB' MEANS 'SUPV EMITTER TABLE'

RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS. 02173	
PROGRAM ROUTINE SUBROUTINE ACRONYM IEWS SORTER SUPV SCHEDULE UPDATE SUBROUTINE		
CODE IDENT NO. 49956	PREPARED BY T. CHERNESKY	DATE 12 APR 76
NUMBER 10	SHEET 1 OF 1	

FLOW CHART

REMARKS



clear:
IN UPDATE
NE
TO
WAITING
SET:
DO NOT UPDATE

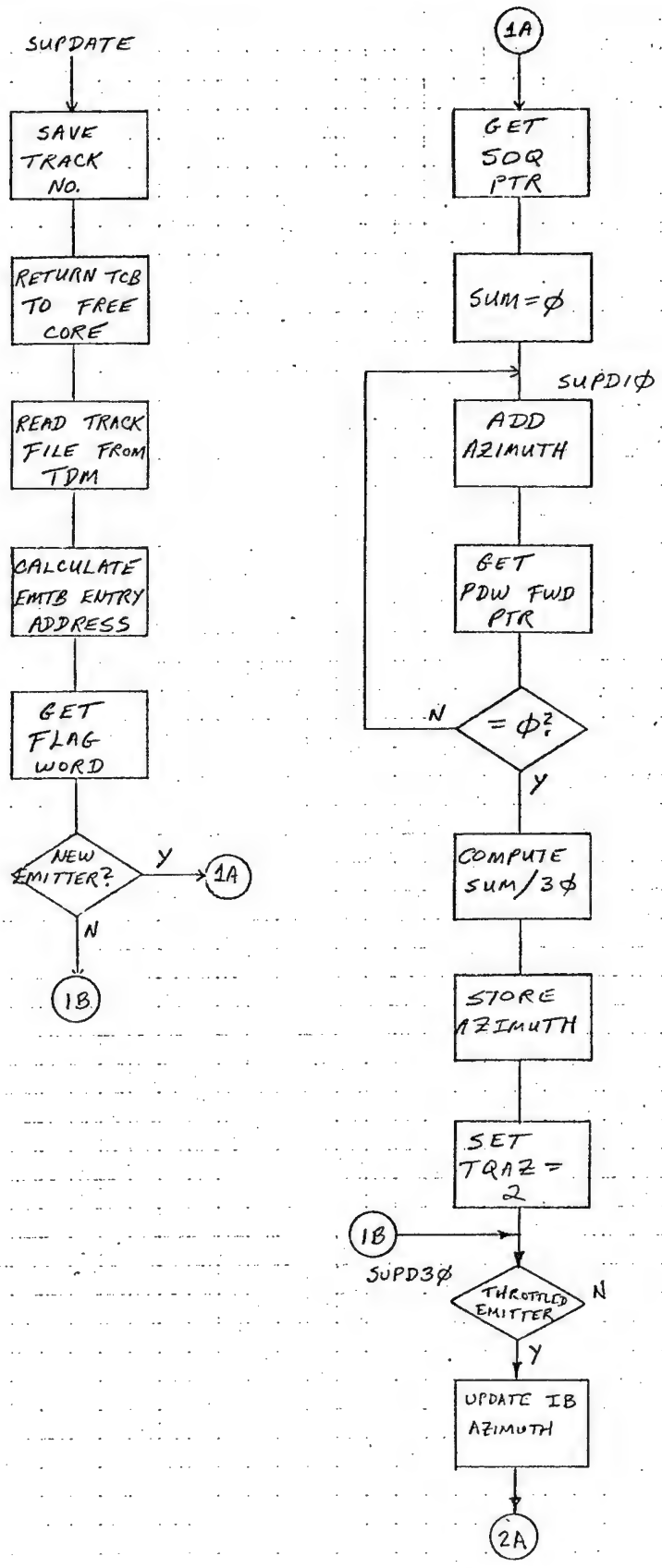
clear Update PDW EOCQ, NE PDW Ptr

RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS 02173
PROGRAM, ROUTINE, SUBROUTINE, ACRONYM	IEWS SORTER SUPV TIME OUT CHECK TASK
CODE IDENT NO. 49956	PREPARED BY T. CHERNESKY
DATE	1 JUN 76
NUMBER	11
SHEET	1 OF 1

FLOW CHART

REMARKS

AZIMUTH CALCULATION



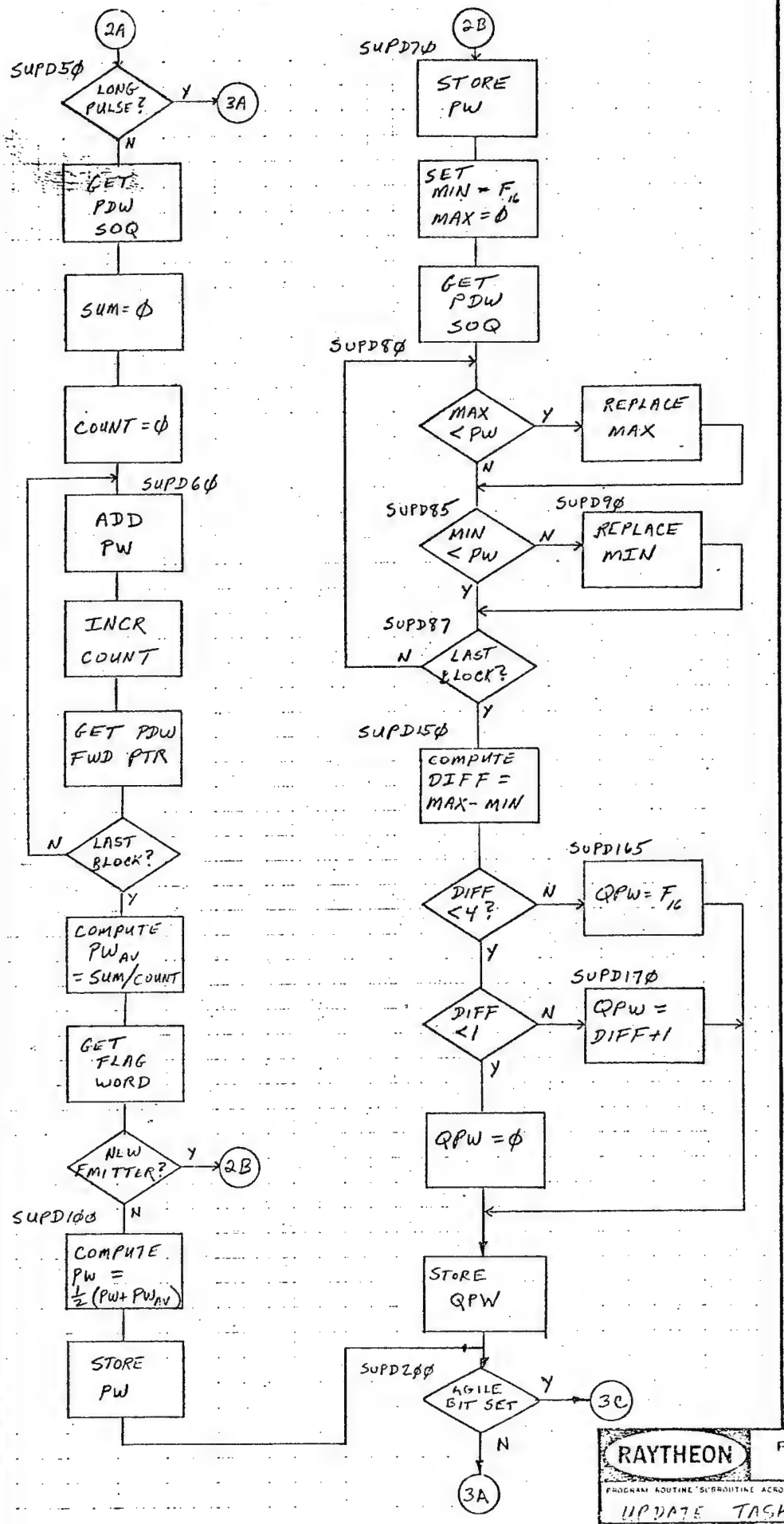
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM "ROUTINE "SUBROUTINE" ACRONYM ILWS SORTER SUPV
UPDATE TASK

CODE IDENT NO.	PREPARED BY	DATE
49956	T. CHERNESKY	3 JUN 76

NUMBER 12 SHEET 1 OF 10

FLOW CHART

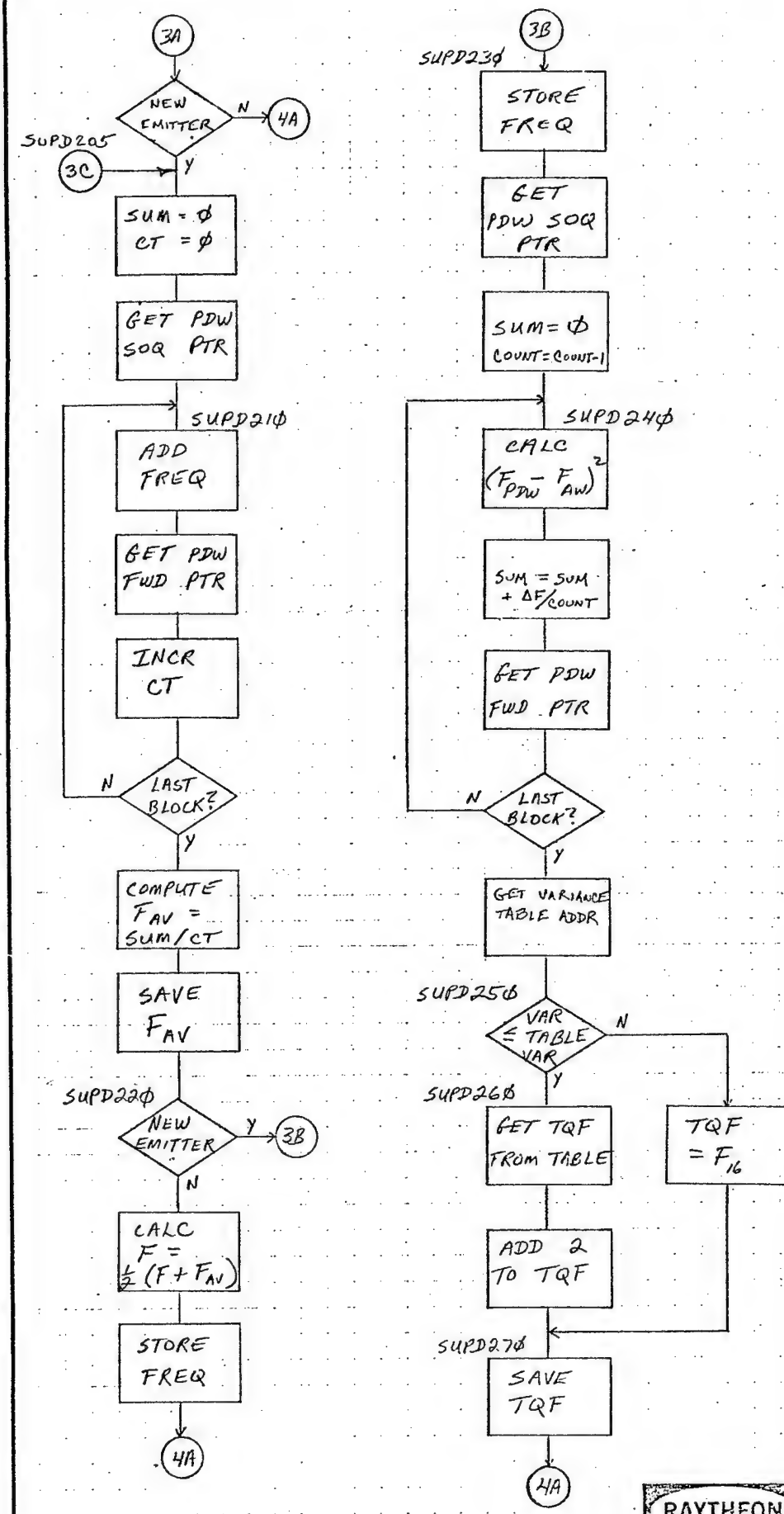


REMARKS

PULSE WIDTH CALCULATION

RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS. 02173	
PROGRAM ROUTINE/SUBROUTINE ACRONYM	ILWS SORTER SUPV	
UPDATE TASK		
CODE IDENT NO. 49956	PREPARED BY T. CHERNESKY	DATE 5 MAY 76
NUMBER 13	SHEET 2 OF 10	

FLOW CHART



REMARKS

FREQUENCY CALCULATION

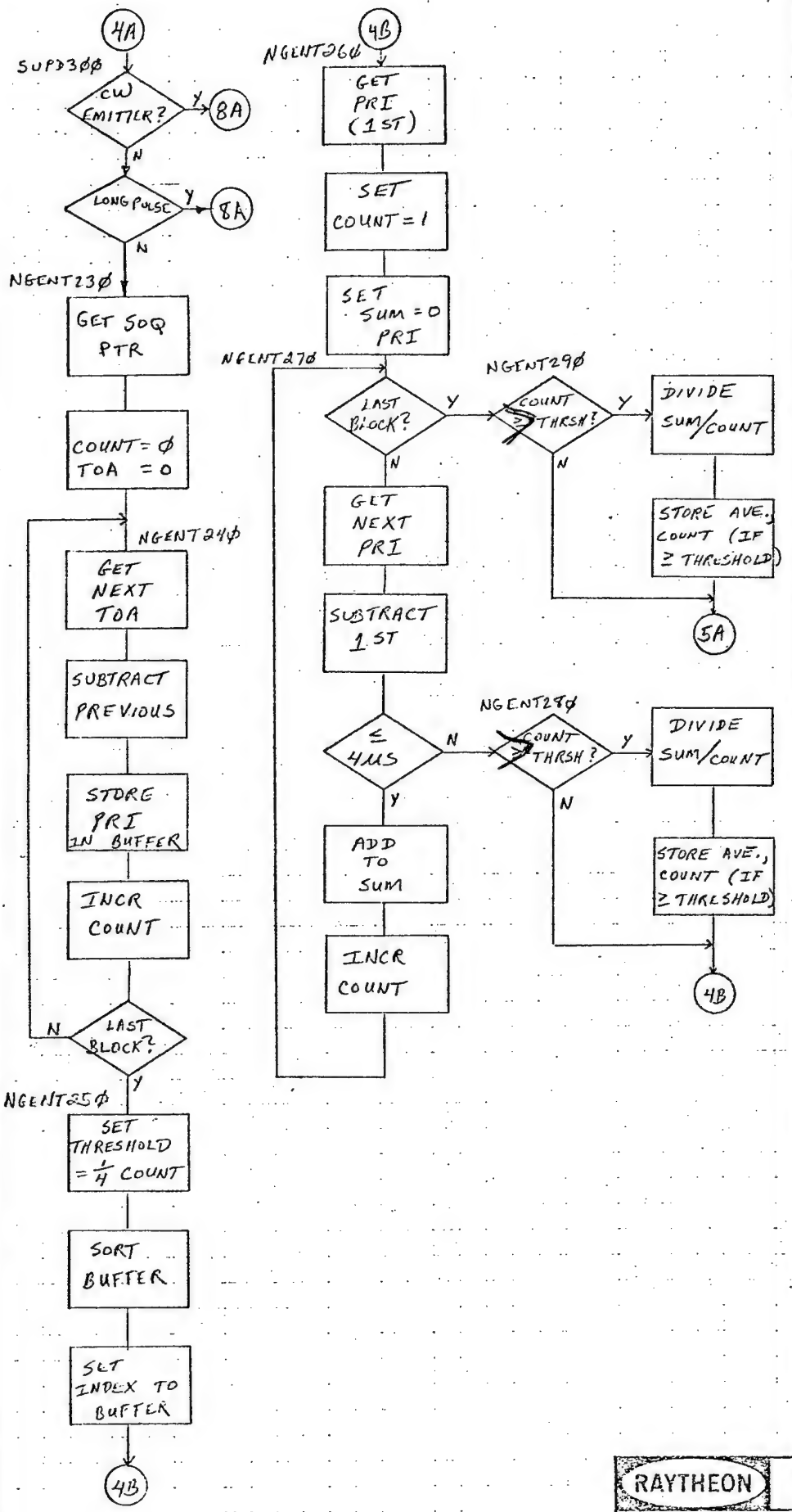
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SUPV
UPDATE TASK

CODE IDENT NO: 49956
PREPARED BY: T. CHERNESKY
DATE: 3 JUN 76

NUMBER: 1W
SHEET 3 OF 10

FLOW CHART



REMARKS

PRI CALCULATION

RAYTHEON

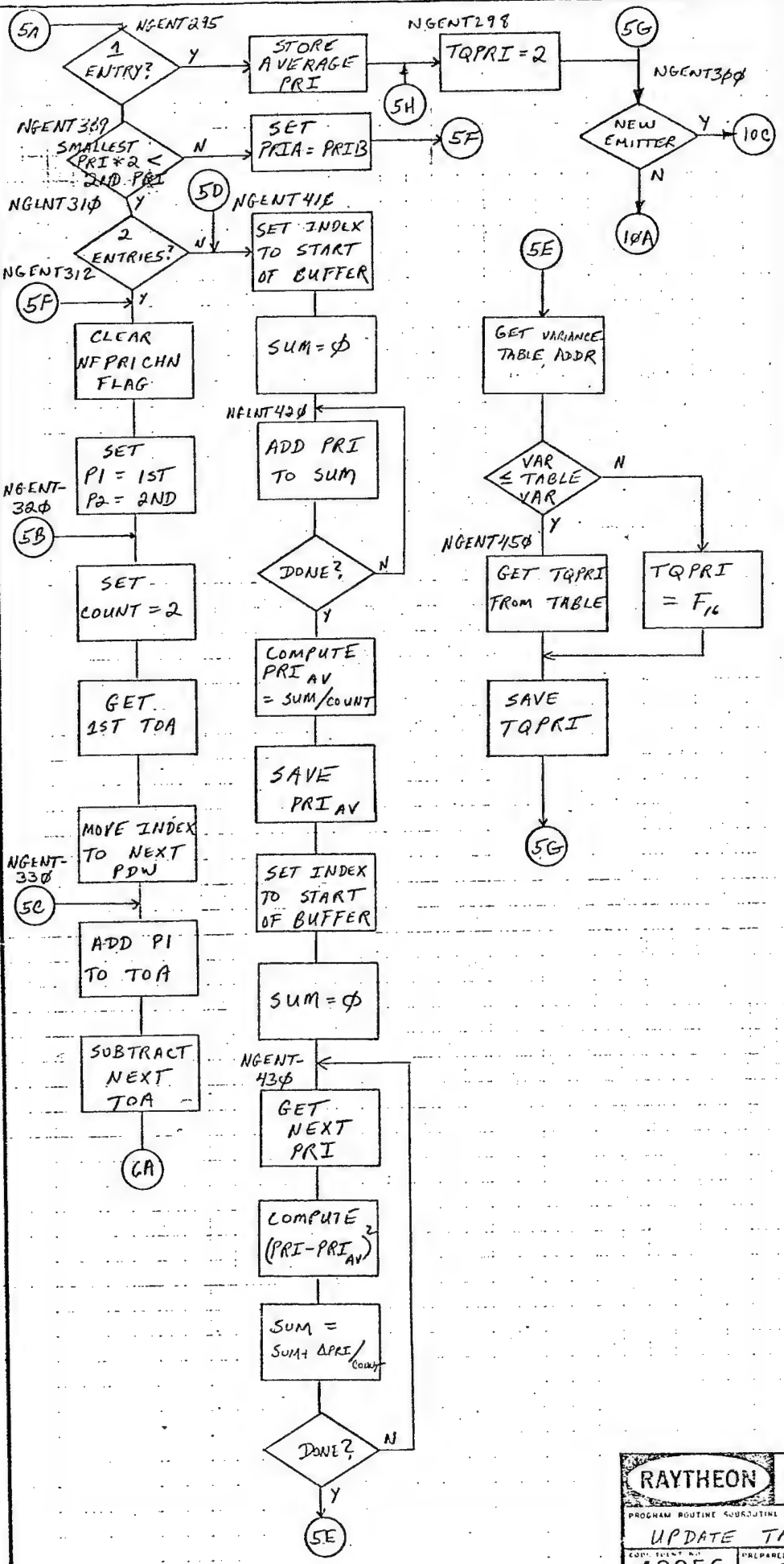
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM IEWS SORTER SUPV
UPDATE TASK

CODE IDENT NO.	PREPARED BY	DATE
49956	T. CHERNESKY	5 MAY 76

NUMBER 15 SHEET 4 OF 10

FLOW CHART



REMARKS

PRI CALCULATION

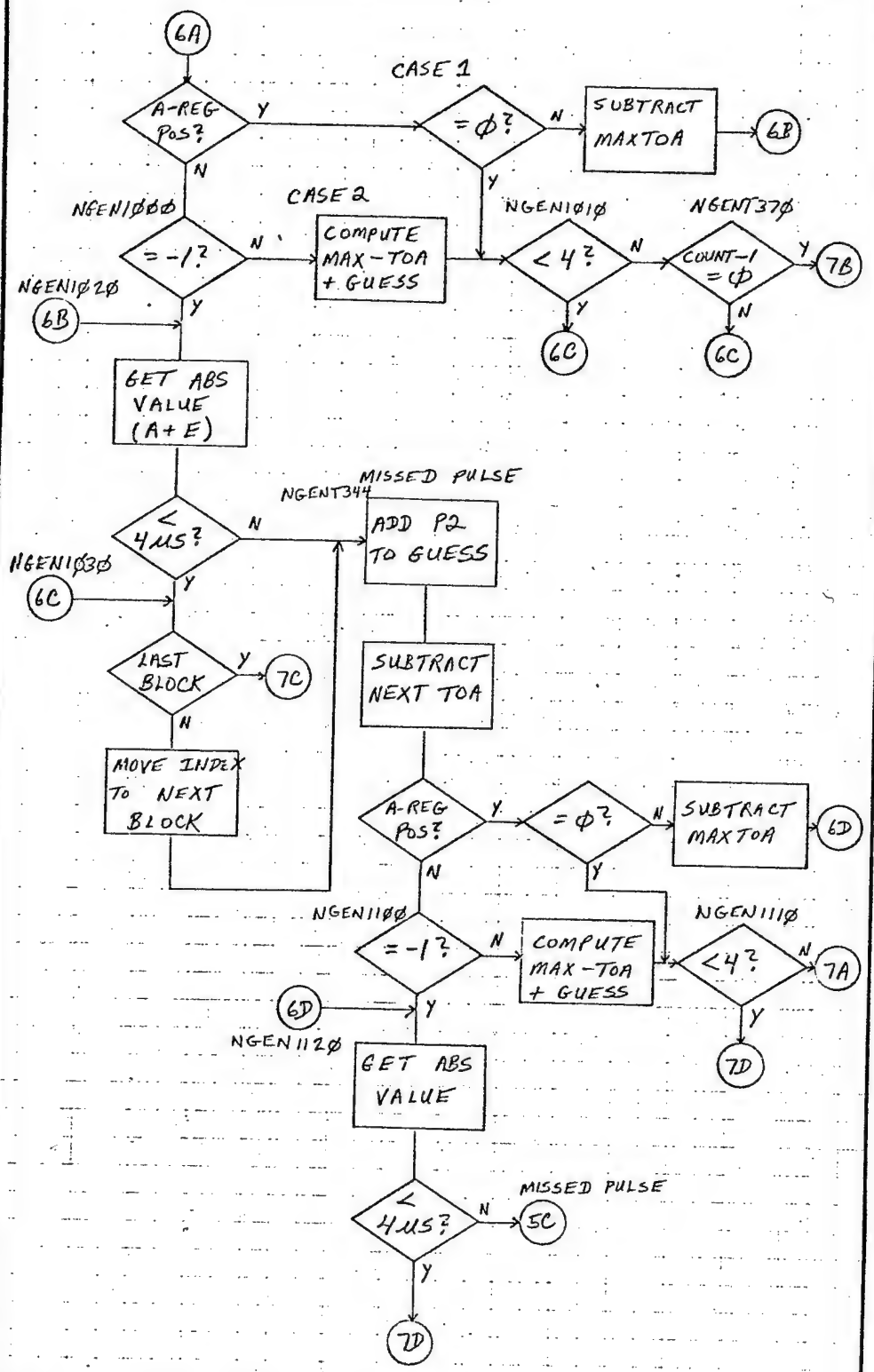
CHAINING AND VARIANCE CALCULATION

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM: 11WS SORTER SUPV
UPDATE TASK

CODE IDENT NO: 49956
PREPARED BY: T. CHERNESKY
DATE: 3 JUN 76
NUMBER: 1
SHEET 5 OF 10

FLOW CHART



REMARKS

PRI CHAIN CALCULATION - TOA WRAPAROUND PROBLEM

CASE 1: GUESS = MAX-N N = Ø, 1, 2, 3
ACTUAL = M M = 3, 2, 1, Ø

GUESS-ACTUAL = LARGE POS NO., I.E., MAX-N-M > 2^{16}
THEREFORE, NEED N+M < 4, ELSE POSSIBLE MISSED PULSE.
IF A-REG POS AND NON-ZERO, THEN comp((GUESS-ACT)-MAX) = N+M

CASE 2: GUESS = M M = Ø, 1, 2, 3
ACTUAL = MAX-N N = 3, 2, 1, Ø.
GUESS-ACTUAL = LARGE NEG. NO., M-MAX-N
THEREFORE, N+M < 4, ELSE ERROR.
IF A NEG AND A ≠ -1, THEN
MAX-ACT+GUESS = MAX-(MAX-N)+M = N+M

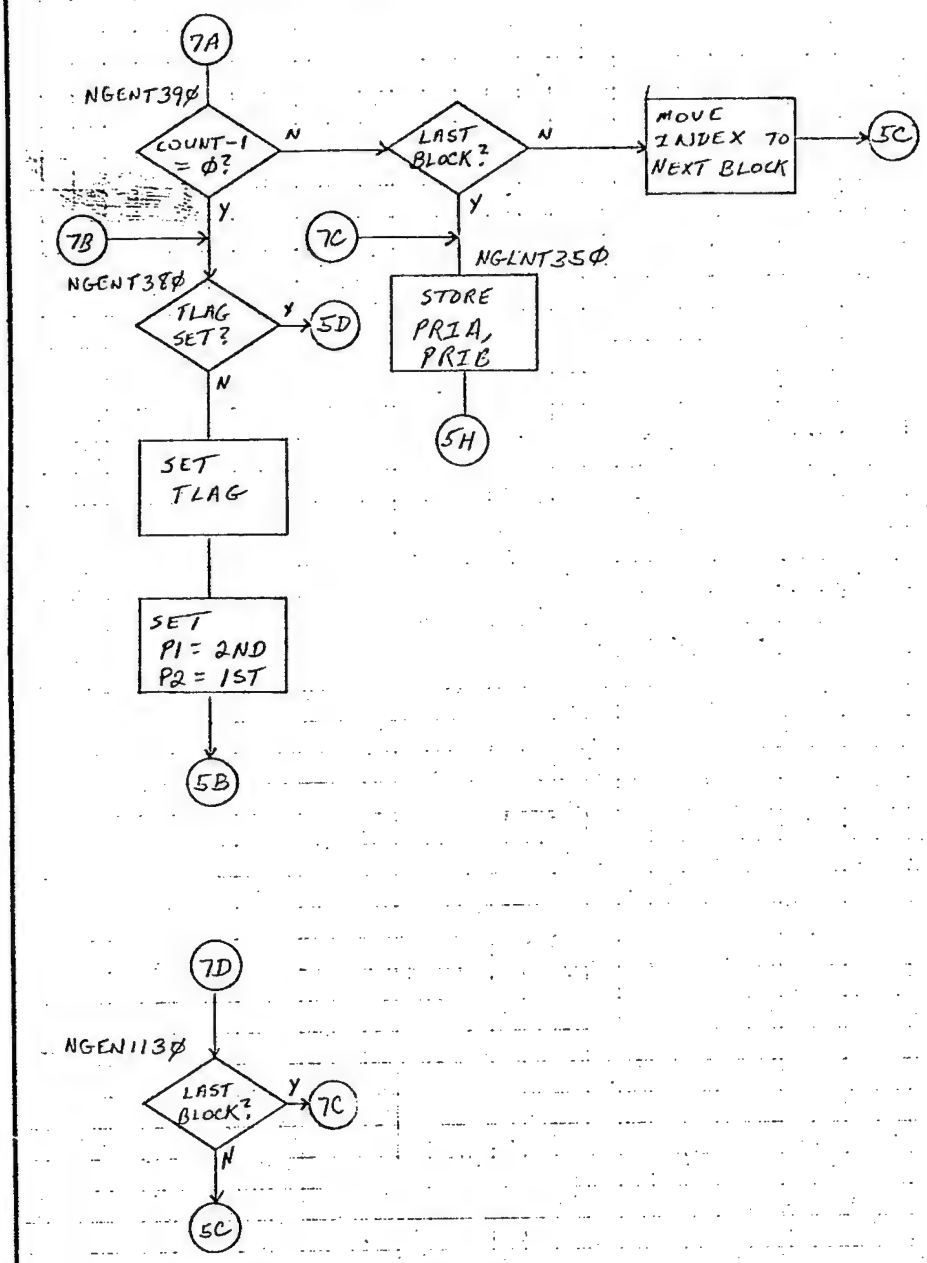
RAYTHEON COMPANY
LEXINGTON, MASS 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM: ILWS SORTER SUBV
UPDATE TASK

CODE IDENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 7 MAY 72

NUMBER 17 | SHEET 6 OF 10

FLOW CHART



REMARKS

PRI CHAIN CALCULATION

RAYTHEON

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

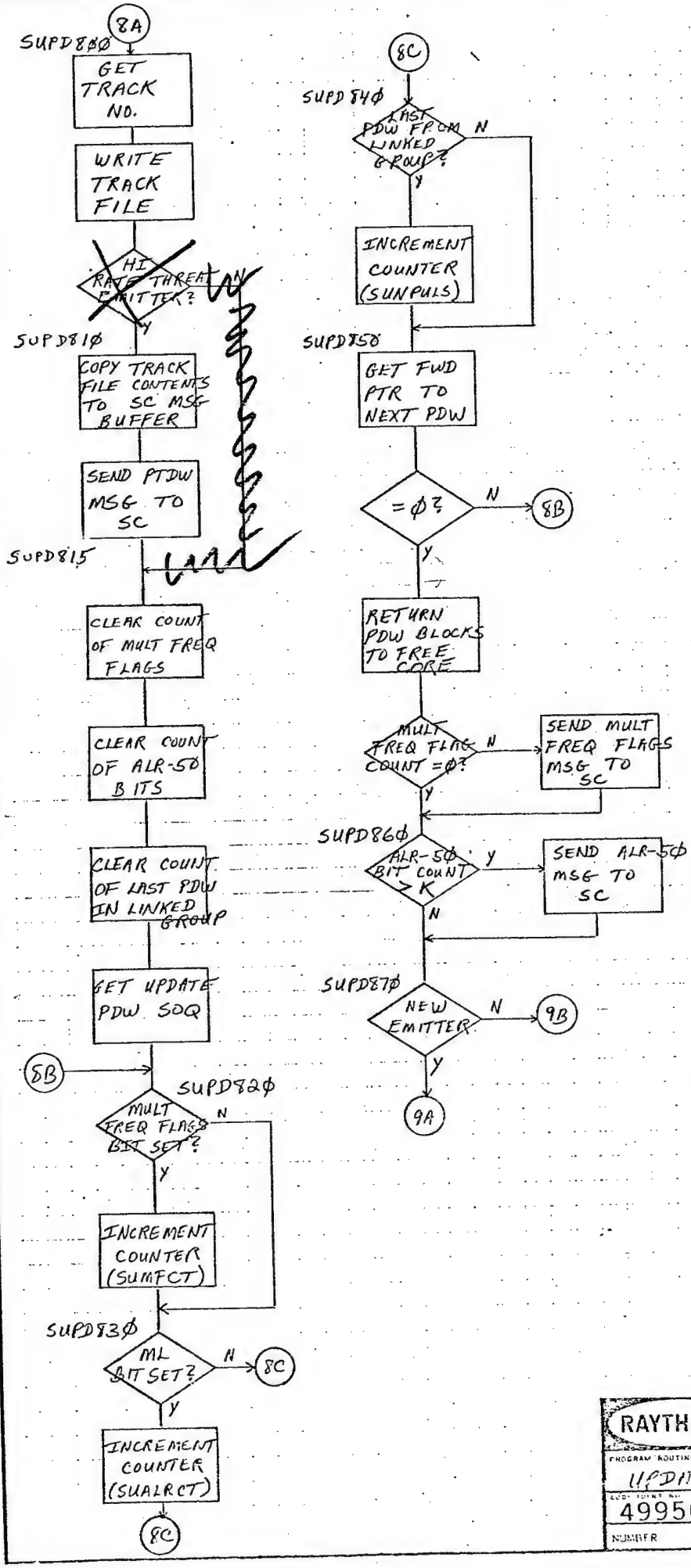
PROGRAM ROUTINE SUBROUTINE ACRONYM IEWS SORTER SUPV
UPDATE TASK

CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	3 JUN 76

NUMBER 18 SHEET 7 OF 10

10-2319 (8 72)

FLOW CHART



REMARKS

WRITE TRACK FILE AND OUTPUT MESSAGES TO SC

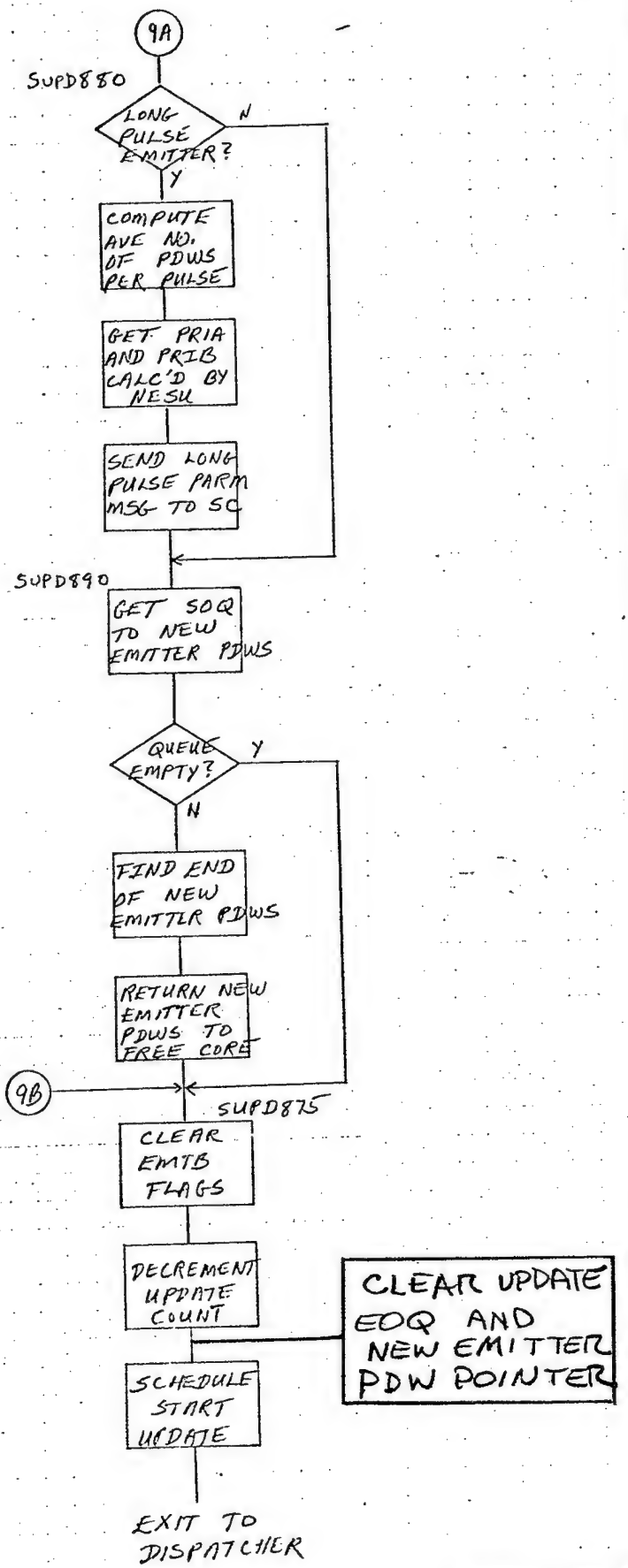
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE'S SUBROUTINE ACRONYM IEWS SORTER SUPV
UPDATE TASK

COMPUTER PROGRAM NO. 49956 | PREPARED BY T. CHEKNESKY | DATE 3 JUN 76

NUMBER 19 | SHEET 8 OF 10

FLOW CHART



REMARKS

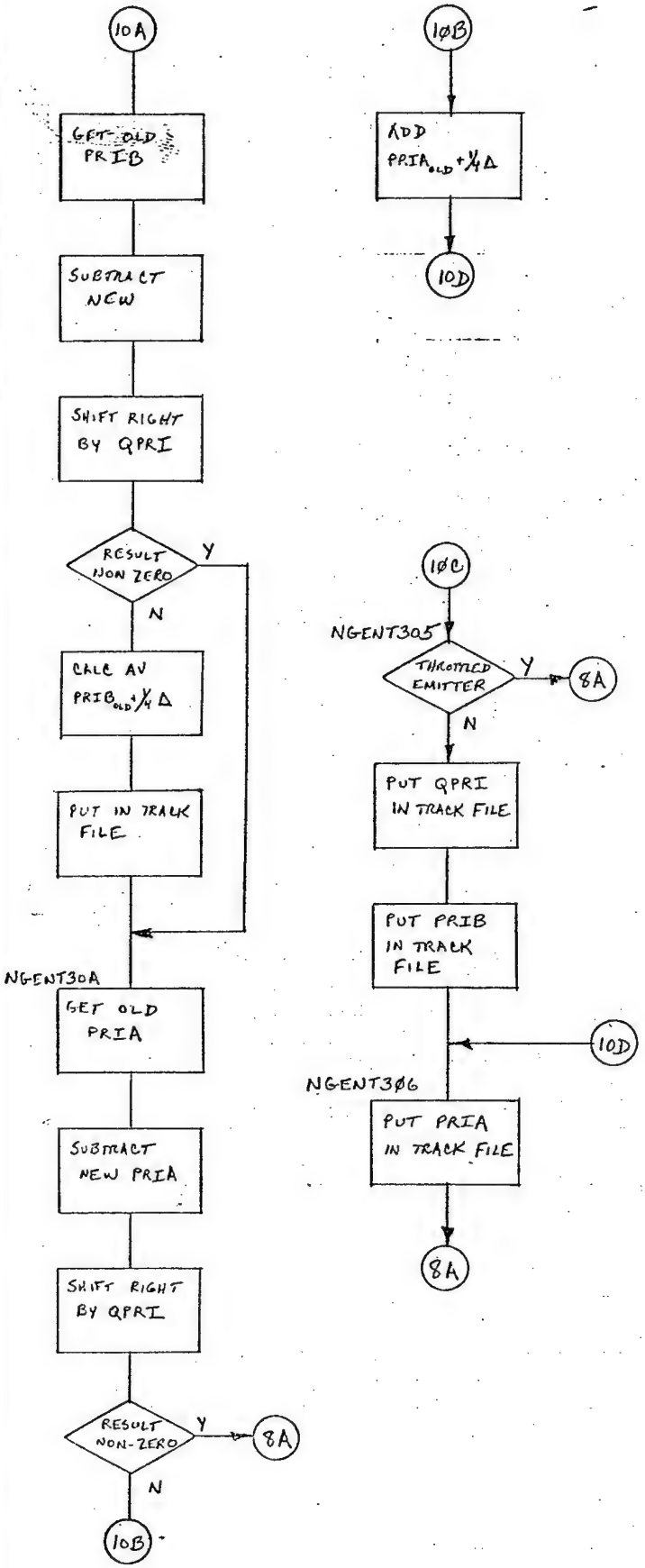
WRITE TRACK FILE AND OUTPUT MESSAGES TO SC

FLAGS CLEARED:
1. IN UPDATE
2. WAITING FOR PDWS
3. TIME OUT
4. NEW EMITTER

RAYTHEON COMPANY LEXINGTON, MASS. 02173	
PROGRAM/ROUTINE/SUBROUTINE/ACRONYM: IEWS SORTER SUPV	
UPDATE TASK	
CODE IDENT NO. 49956	PREPARED BY T. CHERNESKY DATE 3 JUN 76
NUMBER 20	SHEET 9 OF 10

FLOW CHART

REMARKS

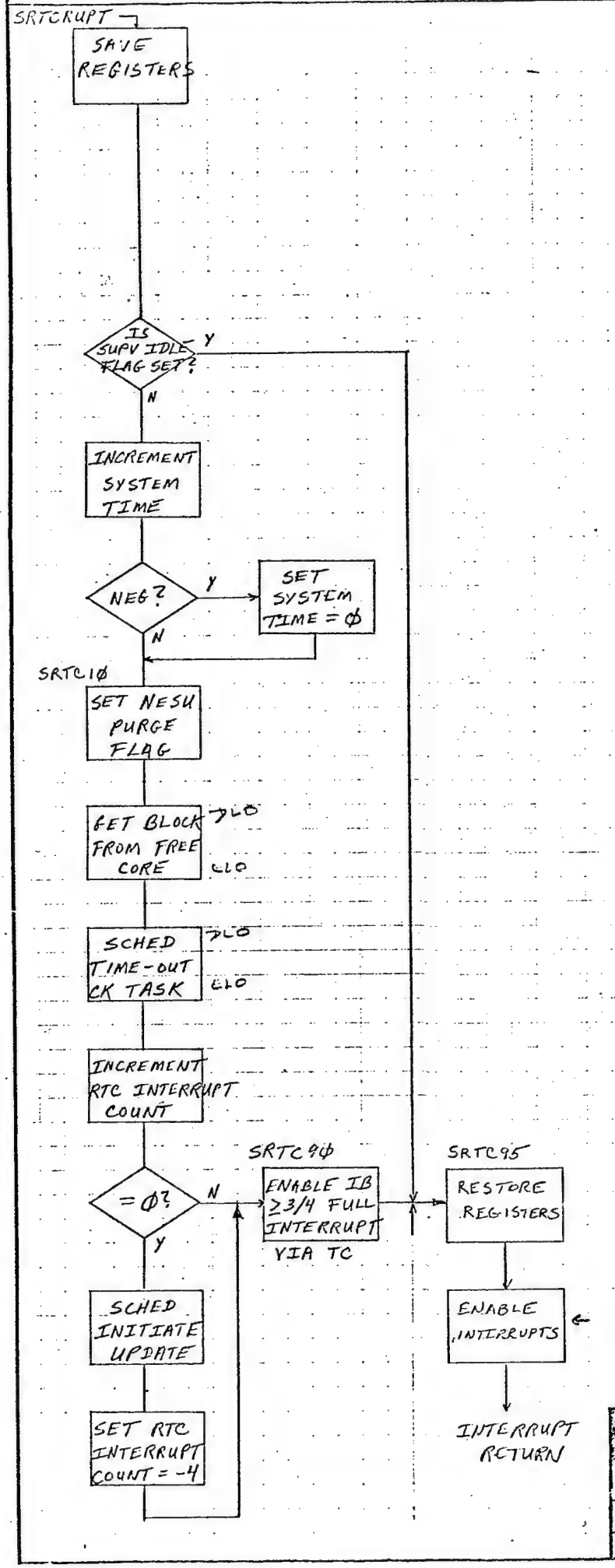


RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS. 02173
PROGRAM/ROUTINE/SUBROUTINE ACRONYM	IEWS SORTER SUPV UPDATE TASK
COMPONENT NO. 49956	PREPARED BY / DATE
NUMBER 21	SHEET 10 OF 10

FLOW CHART

REMARKS

RTC interrupt occurs every 50 msec



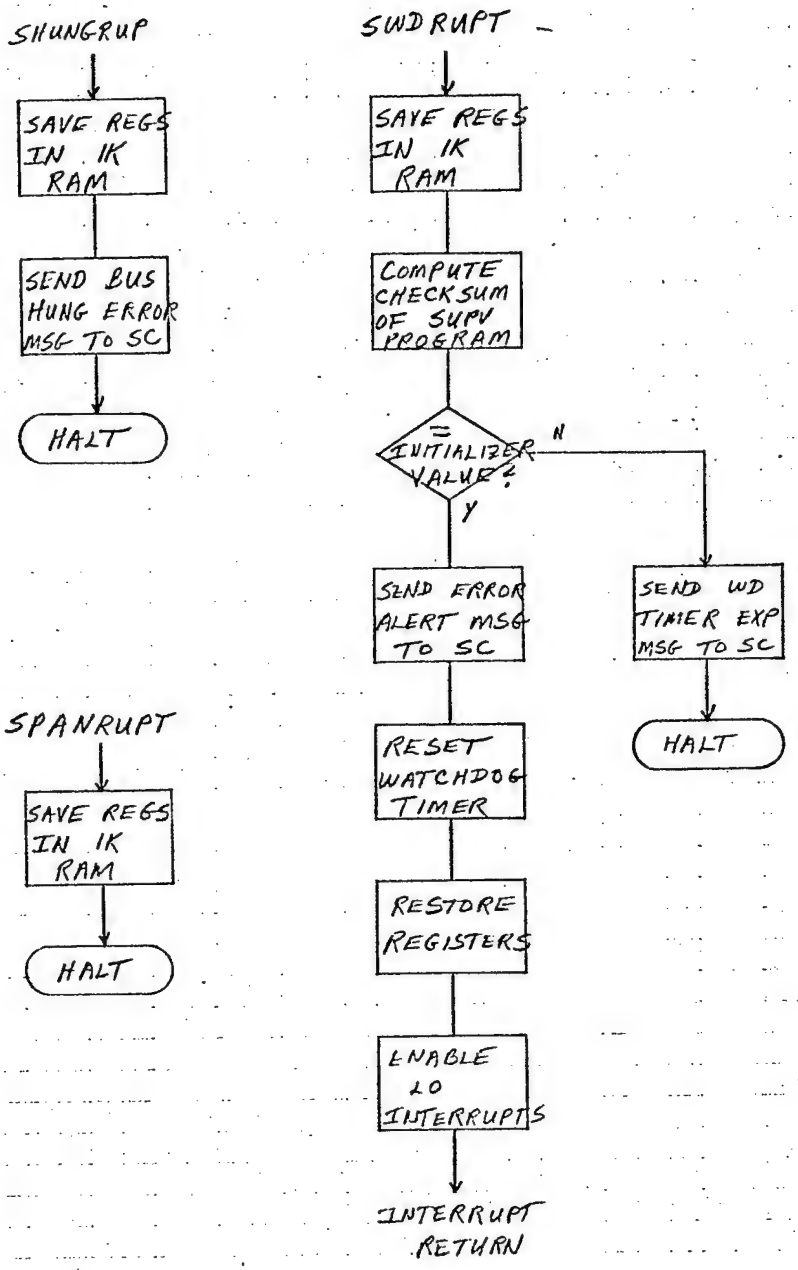
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM: ILUS SORTER SUPV
RTC INTERRUPT HANDLER

CODE IDENT NO: 49956
PREPARED BY: T. FILBRANDT
DATE: 29 MAY 76

NUMBER: 22
SHEET 1 OF 1

FLOW CHART



REMARKS

REGS. SAVED ARE A, E, B, X, S, P

RAYTHEON

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM IEWS SORTER SUPV BUS HUNG / WATCHDOG TIMER / PANIC BUTTON

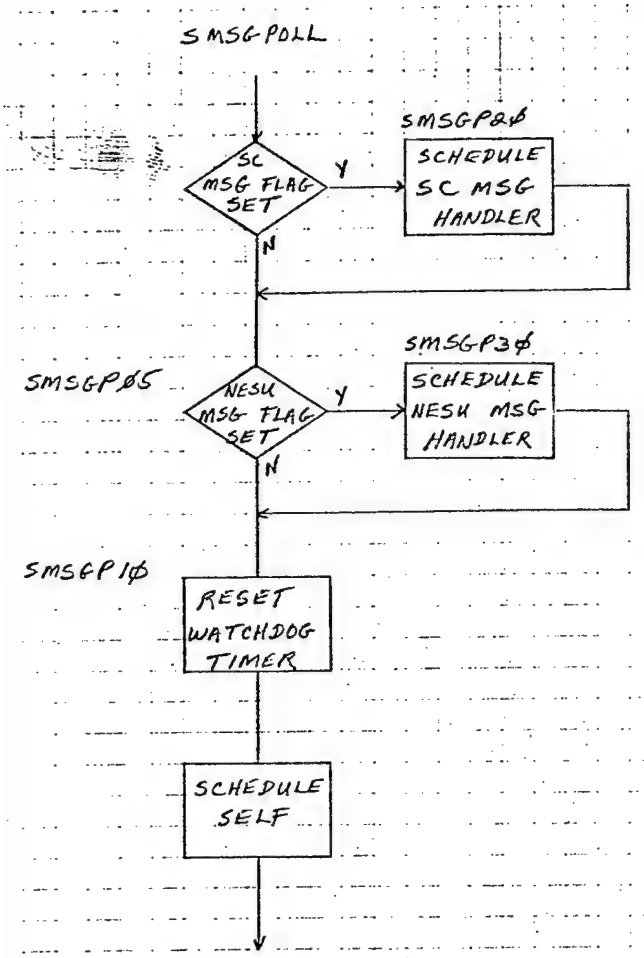
CODE IDENT NO 49956 | PREPARED BY T. CHERNESKY | DATE 27 MAY 76

NUMBER 23 | SHEET 1 OF 1

10-2319 (8 72)

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

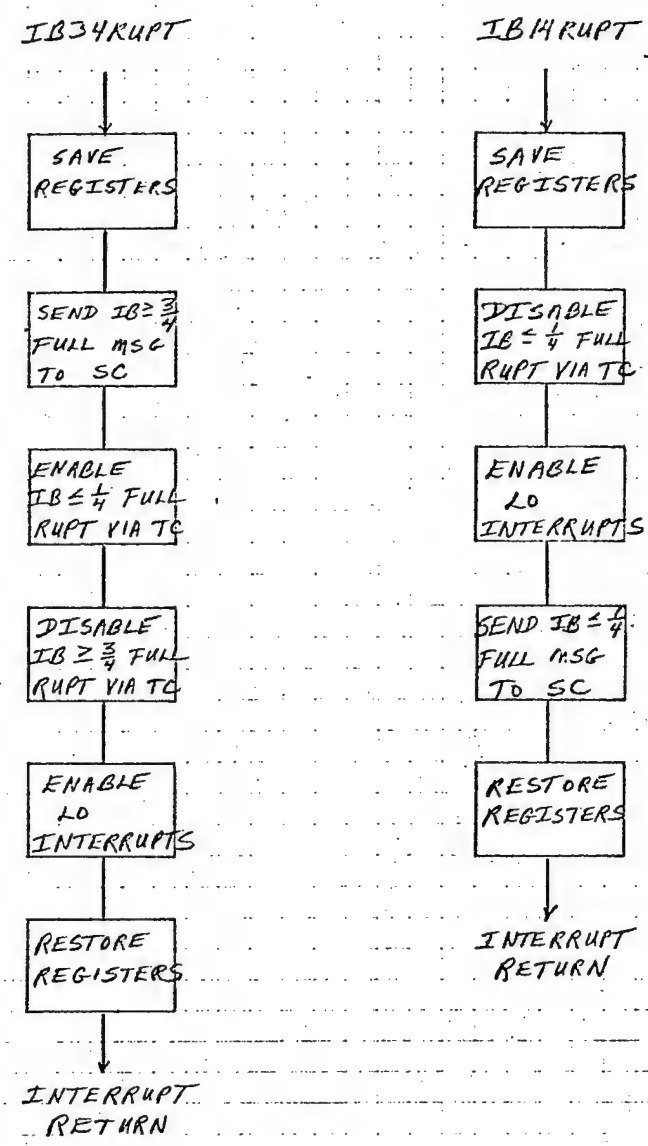
PROGRAM "ROUTINE" SUBROUTINE ACRONYM IEWS SORTER SUPV

MESSAGE POLLING TASK

CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	12 APR 76

NUMBER 04 SHEET 1 OF 1

FLOW CHART



REMARKS

IB ≥ ¾ FULL INTERRUPT IS ENABLED VIA TC EVERY RTC INTERRUPT

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SUPV
IB INTERRUPT HANDLERS

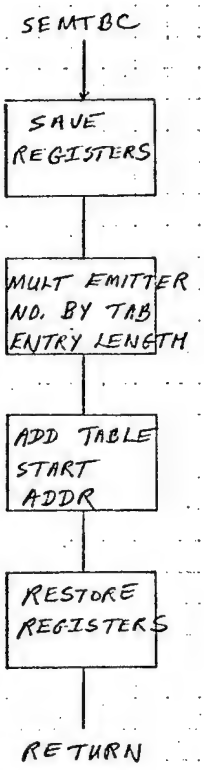
CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	30APR76

NUMBER 05 SHEET 1 OF 1

10-2319-16 72

FLOW CHART

REMARKS



CALL SEQ —

LDSA (EMITTER NO.)

JSUB (= SEMTBC)

STSA (EMTB ENTRY ADDR.)

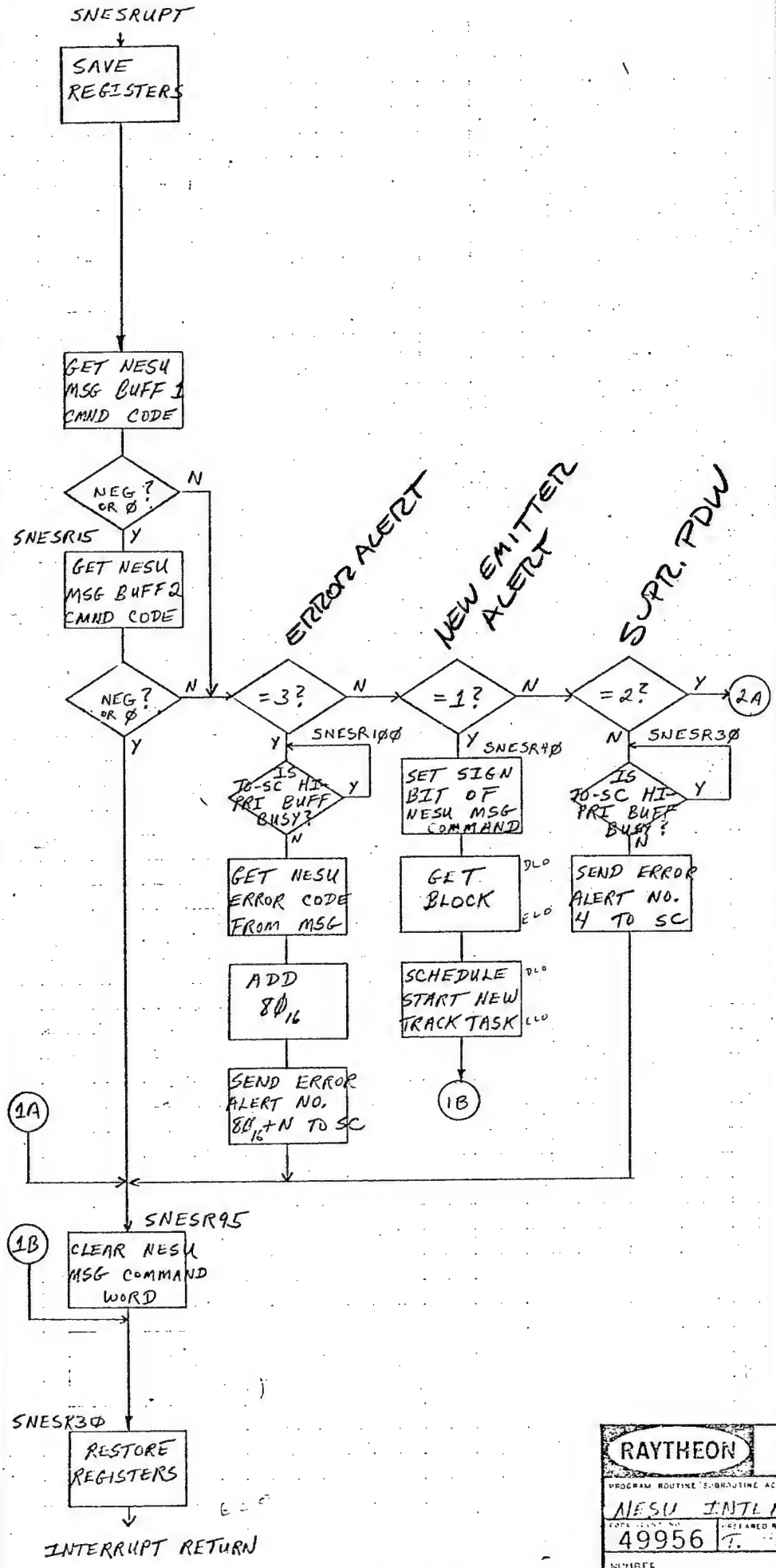
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM IEWS SORTER SUPV
CALC. EMITTER TABLE ENTRY ADDR SUBR.

COMPUTER NO.	PREPARED BY	DATE
49956	T. CHERNESKY	30 APR 76

NUMBER 26 SHEET 1 OF 1

FLOW CHART



REMARKS

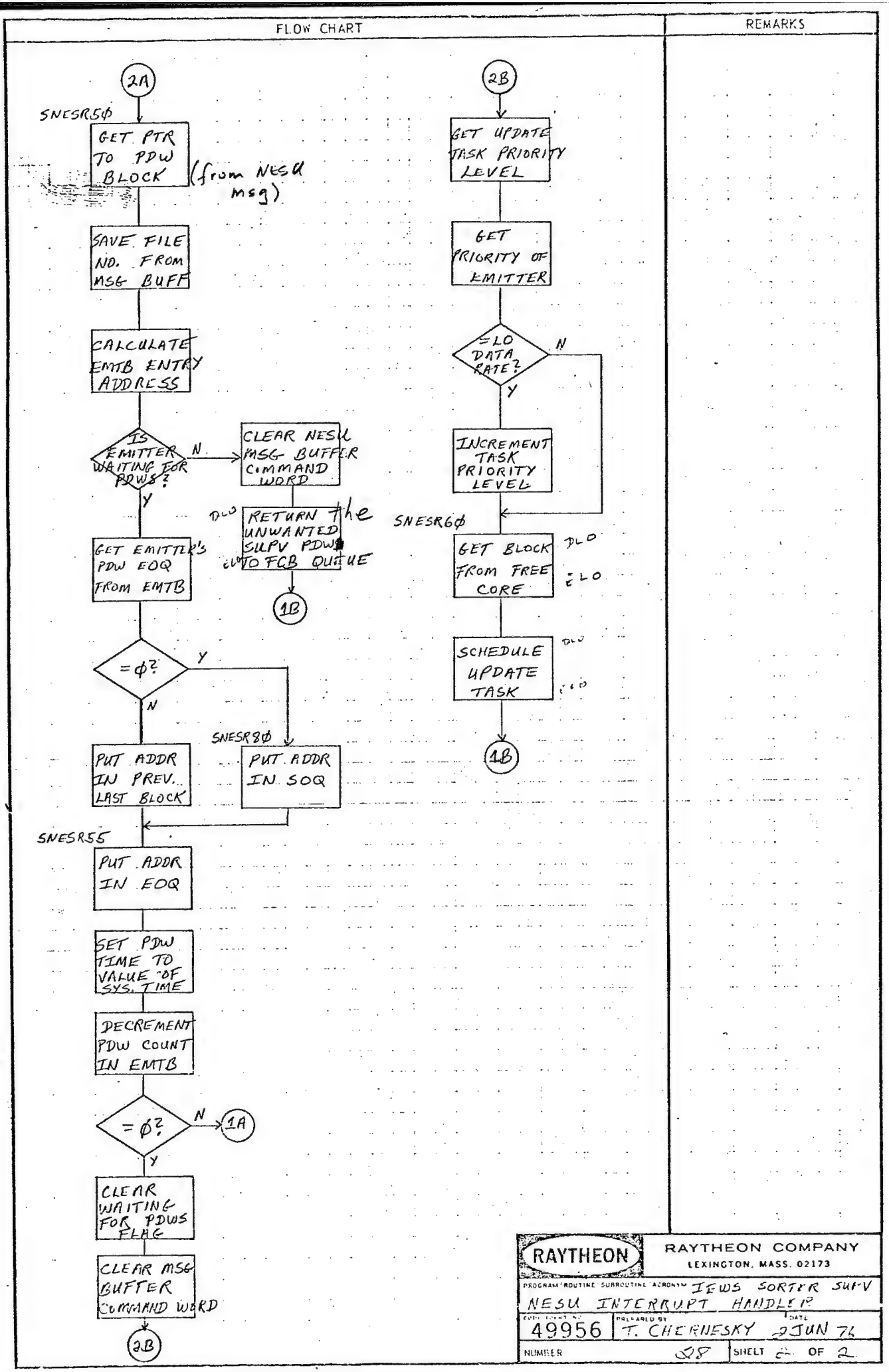
NEGATIVE COMMAND CODE MEANS NEW EMITTER ALERT MSG HAS BEEN PUT IN THIS BUFFER BY NESU AND IS BEING PROCESSED. (I.E., START NEW TRACK HAS BEEN SCHEDULED.)

ERROR ALERT NO. 4 MEANS "INVALID MSG REC'D FROM NESU"

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

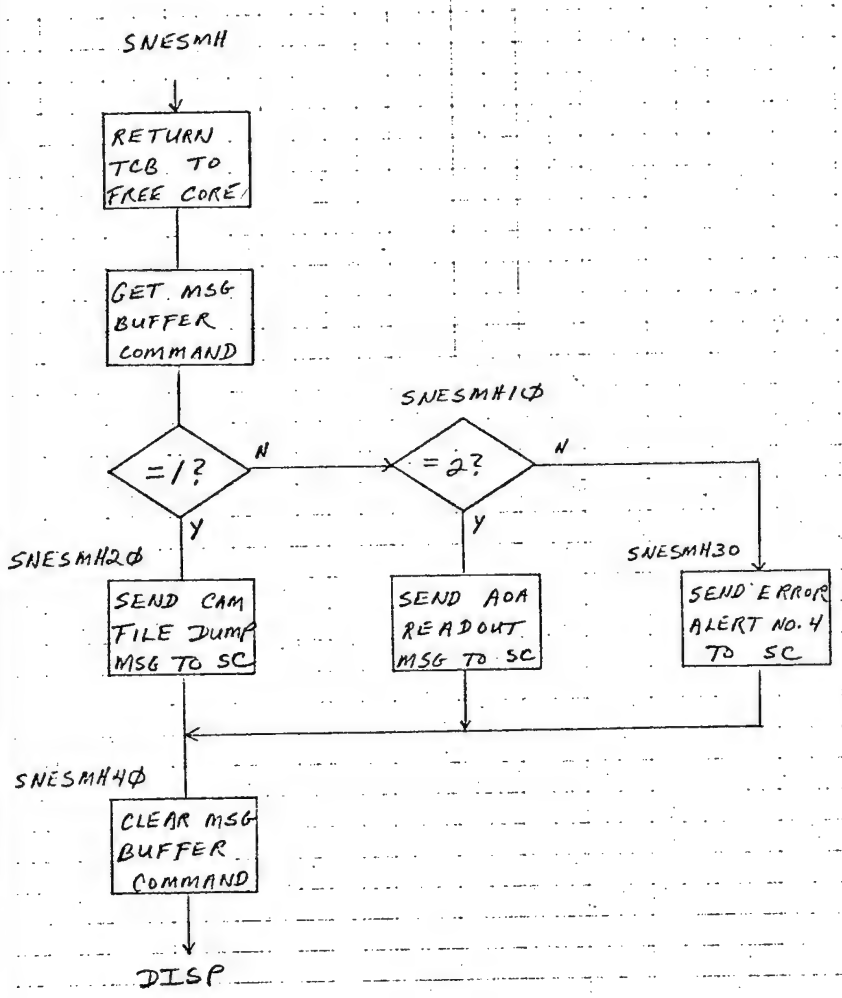
PROGRAM ROUTINE SUBROUTINE ACRONYM: IEWS SORTER SUBV
NESU INTERRUPT HANDLER

CODE IDENT NO.	PREPARED BY	DATE
49956	T. HERNISKY	2 JUN 76
NUMBER	27	SHEET 1 OF 2


FLOW CHART
REMARKS
2A
SNESR5Ø
GET PTR TO PDW BLOCK (from NESU msg)
SAVE FILE NO. FROM MSG BUFF
CALCULATE EMTB ENTRY ADDRESS
IS EMITTER WAITING FOR PDWS?
N
Y
CLEAR NESU MSG BUFFER COMMAND WORD
DLO
RETURN the UNWANTED SUPV PDW TO FCB QUEUE
ELO
1B
GET EMITTER'S PDW EOQ FROM EMTB
=Ø?
Y
N
SNESR8Ø
PUT ADDR IN PREV. LAST BLOCK
PUT ADDR IN SOQ
SNESR55
PUT ADDR IN EOQ
SET PDW TIME TO VALUE OF SYS. TIME
DECREMENT PDW COUNT IN EMTB
=Ø?
N
1A
Y
CLEAR WAITING FOR PDWS FLAG
CLEAR MSG BUFFER COMMAND WORD
2B
2B
GET UPDATE TASK PRIORITY LEVEL
GET PRIORITY OF EMITTER
=LO DATA RATE?
N
Y
INCREMENT TASK PRIORITY LEVEL
SNESR6Ø
GET BLOCK FROM FREE CORE
DLO
ELO
SCHEDULE UPDATE TASK
DLO
ELO
1B
RAYTHEON
RAYTHEON COMPANY
LEXINGTON, MASS. 02173
PROGRAM/ROUTINE/SUBROUTINE/ACRONYM IEWS SORTER SUPV
NESU INTERRUPT HANDLER
PART/DWG NO. 49956
PREPARED BY T. CHERNESKY
DATE 2JUN 74
NUMBER 28
SHEET 2 OF 2

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

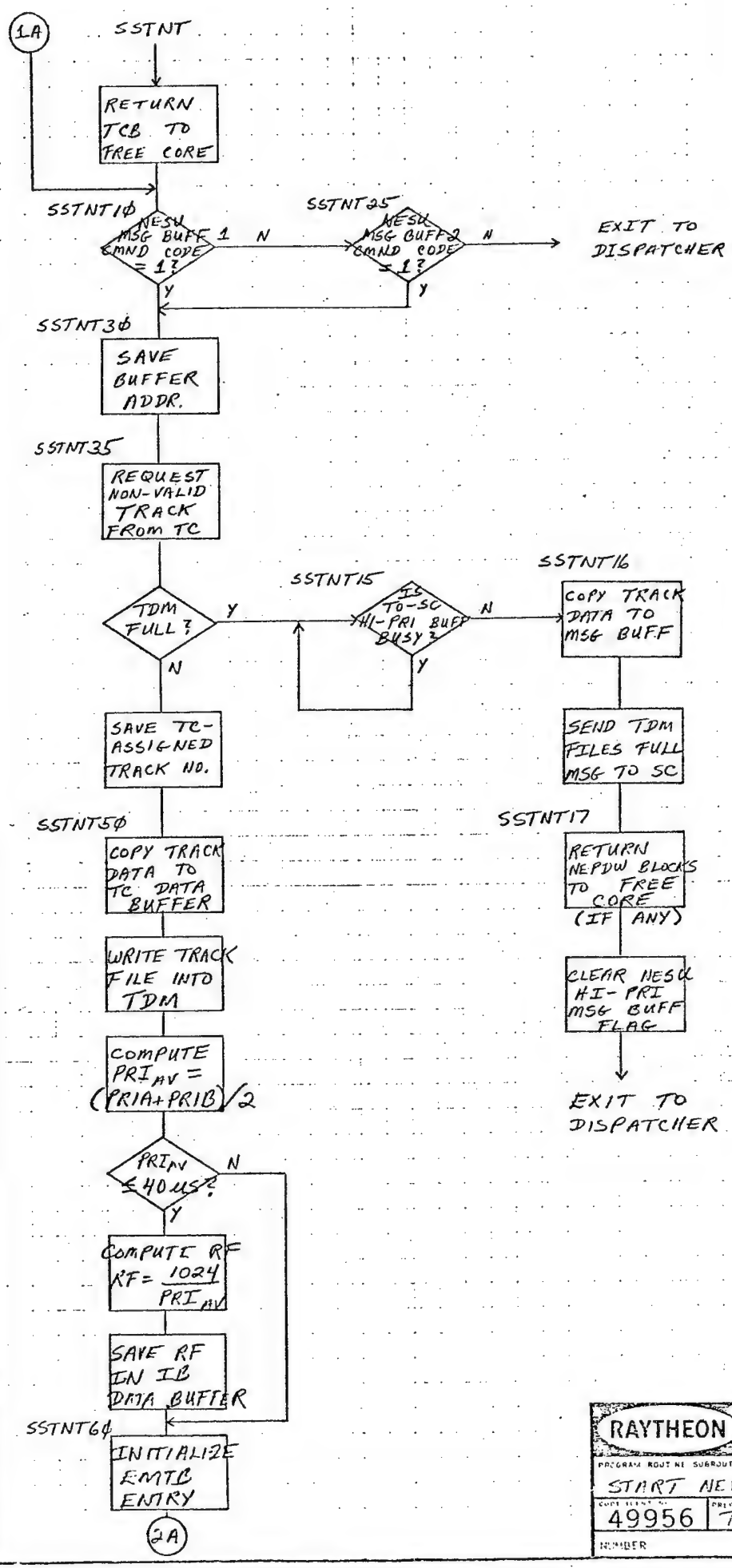
PROGRAM/ROUTINE/SUBROUTINE/ACRONYM: IEWS SORTER SUPV
NESU MESSAGE HANDLER

CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	10 APR 76

NUMBER 29 SHEET 1 OF 1

10-2319 (8-72)

FLOW CHART



REMARKS

$PRI_{AV} \leq 40\,ms$ MEANS THROTTLING OF NEW EMITTER IS REQUIRED.

'RF' MEANS 'REDUCTION FACTOR'

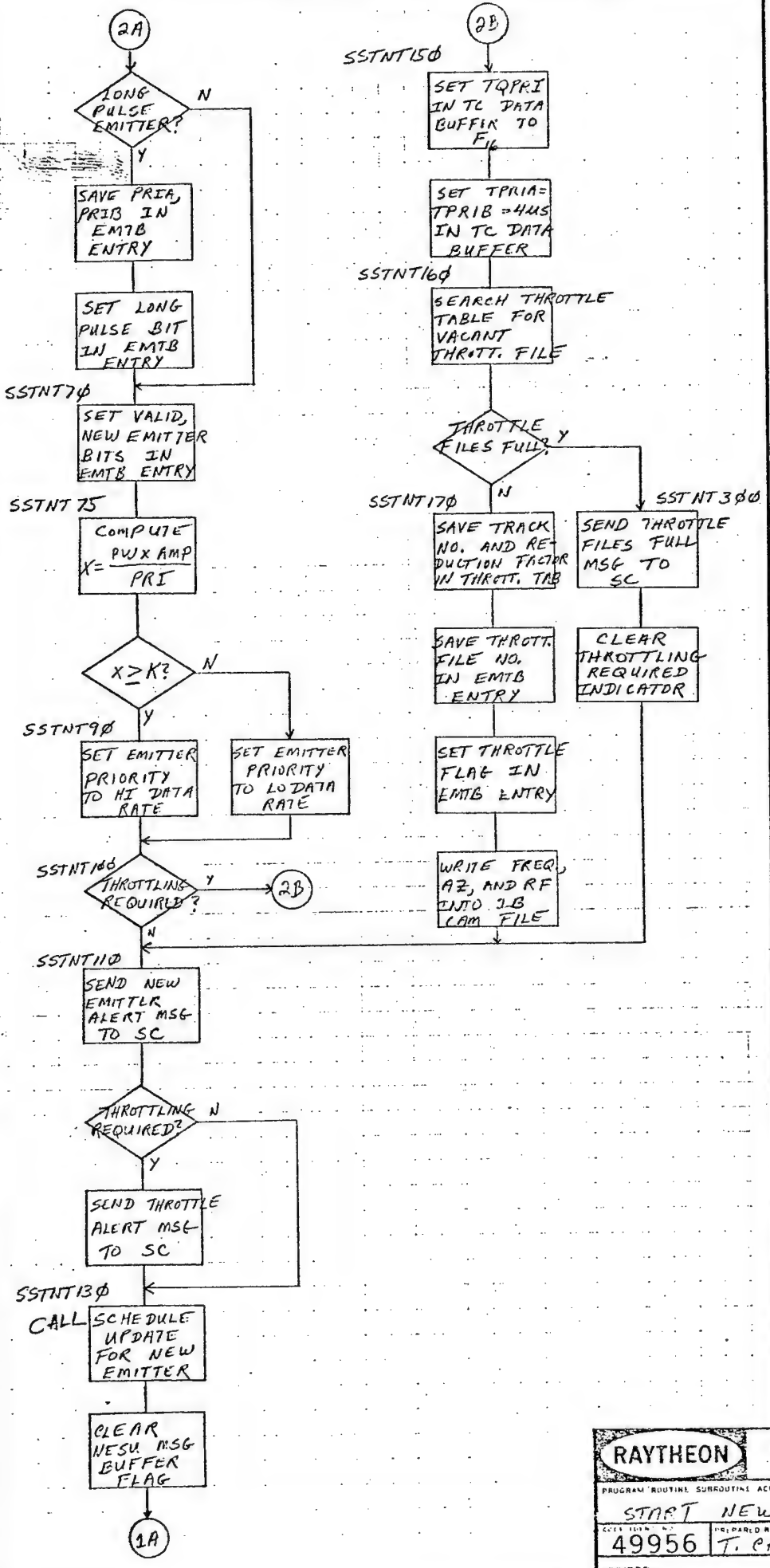
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM, ROUTINE, SUBROUTINE, ACRONYM: IEWS SORTER SUPV
START NEW TRACK TASK

CODE IDENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 8 JUN 76

NUMBER 50 | SHEET 1 OF 2

FLOW CHART



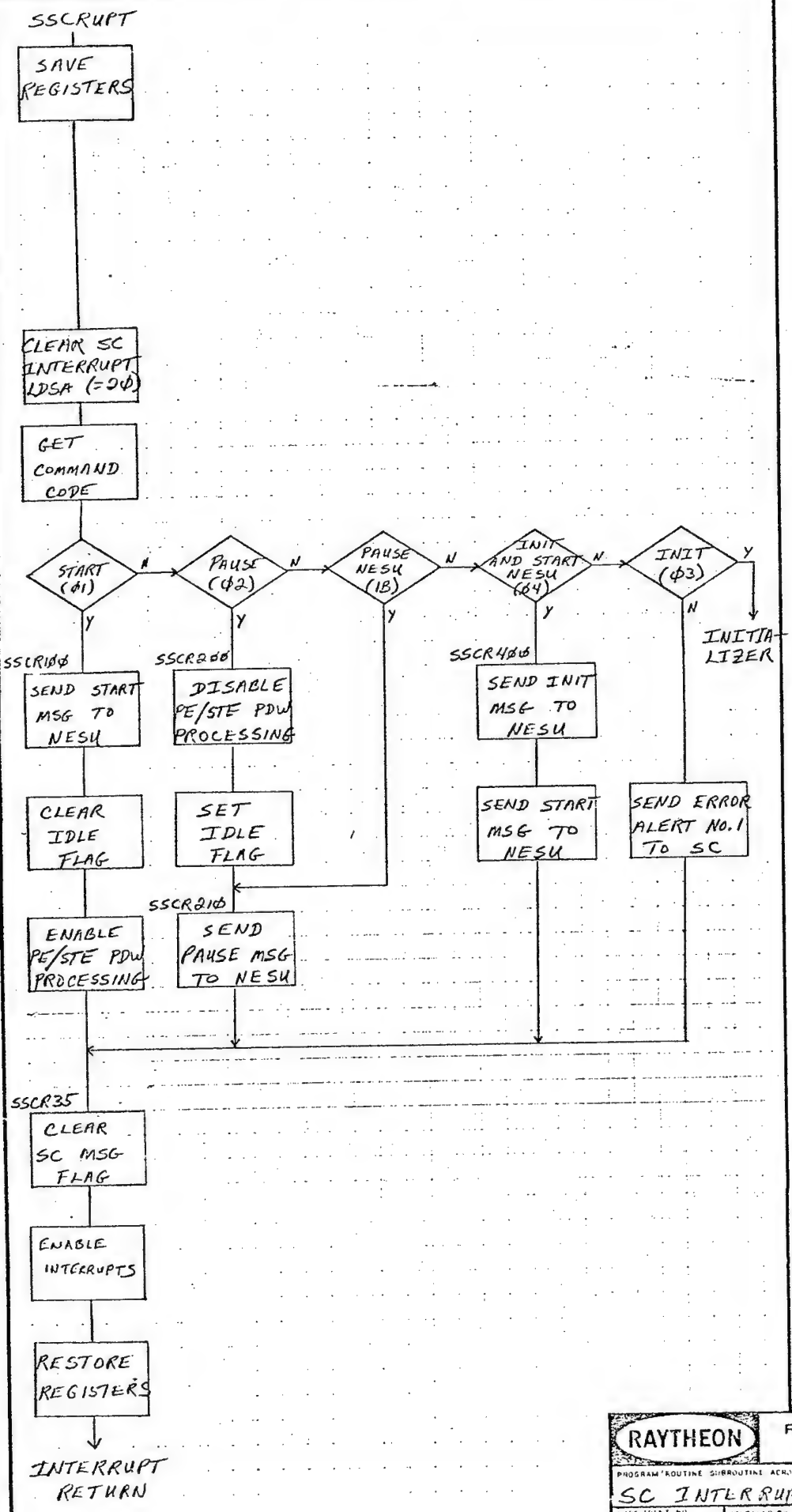
REMARKS

K = TARGET TRACK THRESHOLD

RAYTHEON COMPANY LEXINGTON, MASS. 02173	
PROGRAM ROUTINE SUBROUTINE ACRONYM ILWS SORTER SUPV	
START NEW TRACK TASK	
CODE IDENT. NO. 49956	PREPARED BY T. CHERNESKY DATE 3 MAY 76
NUMBER 31	SHEET 2 OF 2

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE SUBROUTINE ACRONYM: IIWS SORTER SUPV

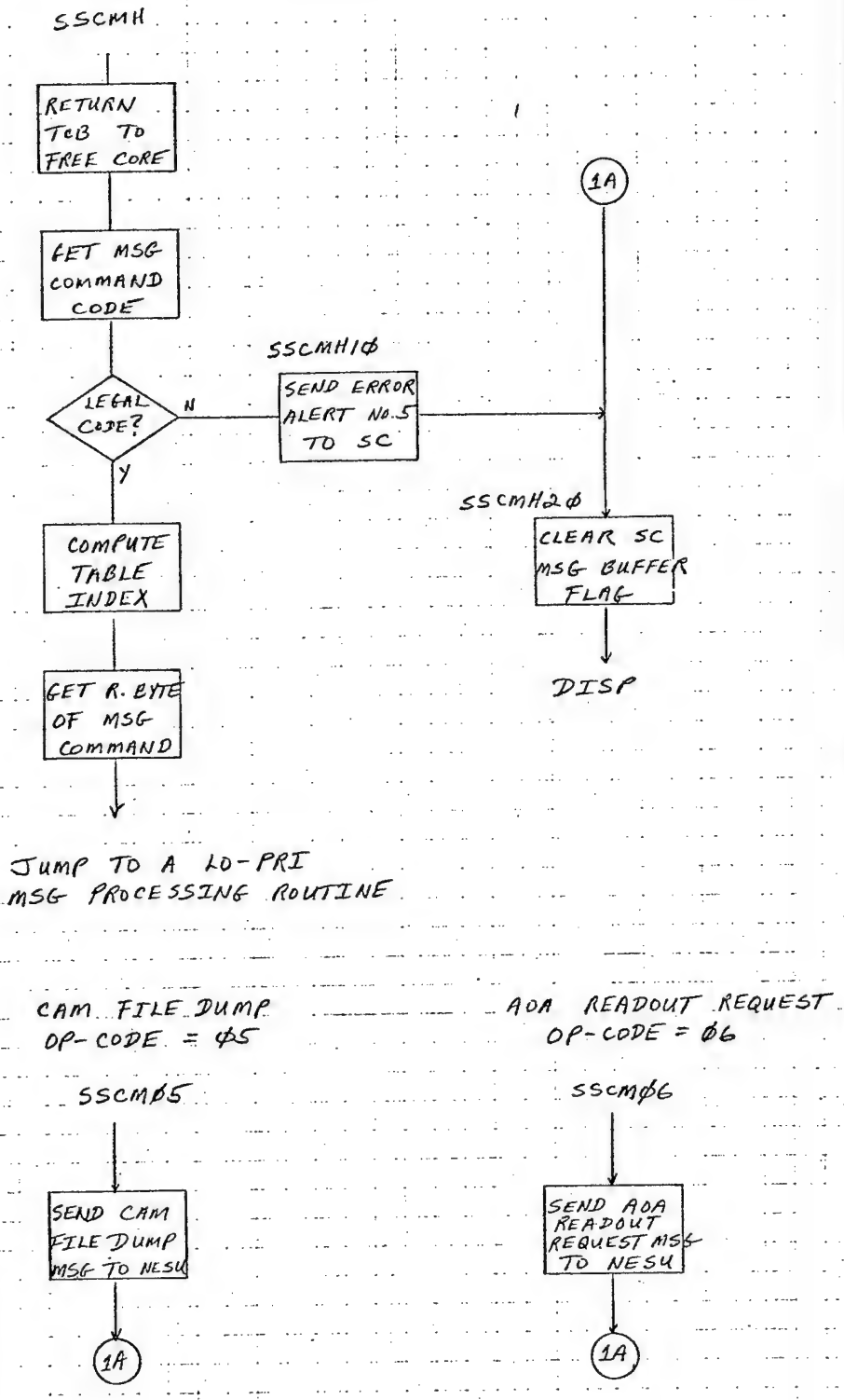
SC INTERRUPT HANDLER

CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	2 JUN 76

NUMBER 30 SHEET 1 OF 1

FLOW CHART

REMARKS



RIGHT BYTE USUALLY CONTAINS SORTER TRACK FILE NO.

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM IEWS SORTER SUPV
SC MESSAGE HANDLING

CODE IDENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 19 APR 76

NUMBER 33 | SHEET 1 OF 5

FLOW CHART

REMARKS

FILE DUMP REQUEST
OP- CODE = ϕ7
SSCMϕ7

N = ϕ

SSCMϕ7A

SEND PTDW FOR TRK N TO SC

N = N+1

N < 128?

Y

N

1A

UPDW REQUEST
OP- CODE = ϕ8
SSCMϕ8

ENABLE UPDWS VIA TC

1A

SUBROUTINE TO SEND 1 PTDW TO SC.
SSCMPTDW

SAVE REGISTERS

SSCMPTϕS

IS TO-SC LO-PRI BUFF BUSY?

Y

N

READ TRK N CONTENTS INTO TC DATA BUFF

SSCMPTIϕ

MOVE TC DATA BUFF TO MSG BUFF

SEND PTDW MSG TO SC

RESTORE REGISTERS

RETURN

SYNTHETIC PDW
OP- CODE = ϕ9
SSCMϕ9

MOVE SPDW FROM MSG BUFF TO IB DATA BUFF

ISSUE IB COMMAND TO PROCESS SPDW

1A

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM ILWS SORTLR SUPV

SC MESSAGE HANDLING

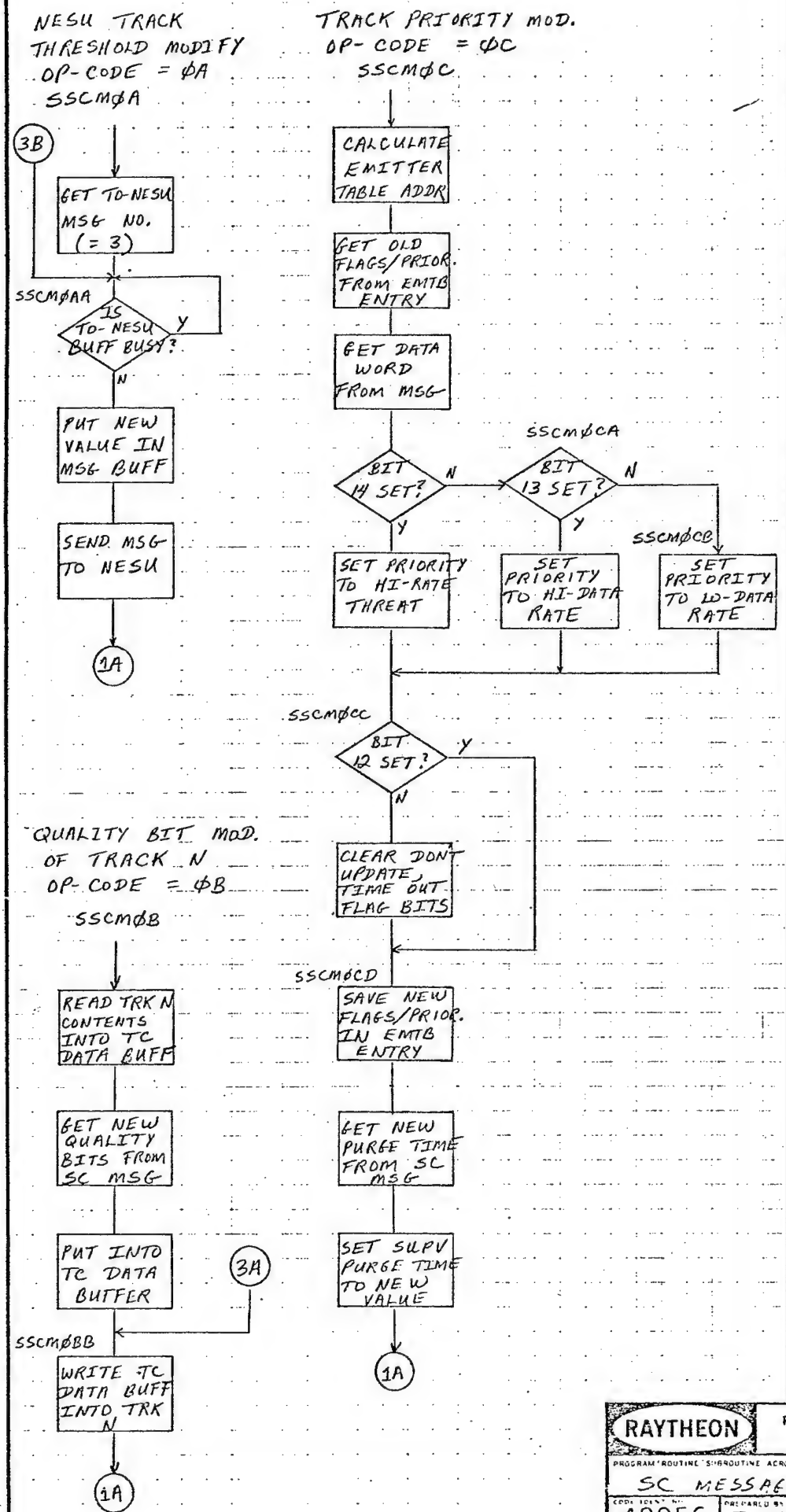
CODE IDENT NO 49956 | PREPARED BY T. CHERNESKY | DATE 12 APR 76

NUMBER 34 | SHEET 2 OF 8

10-2379-8 72

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SWIV
SC MESSAGE HANDLING

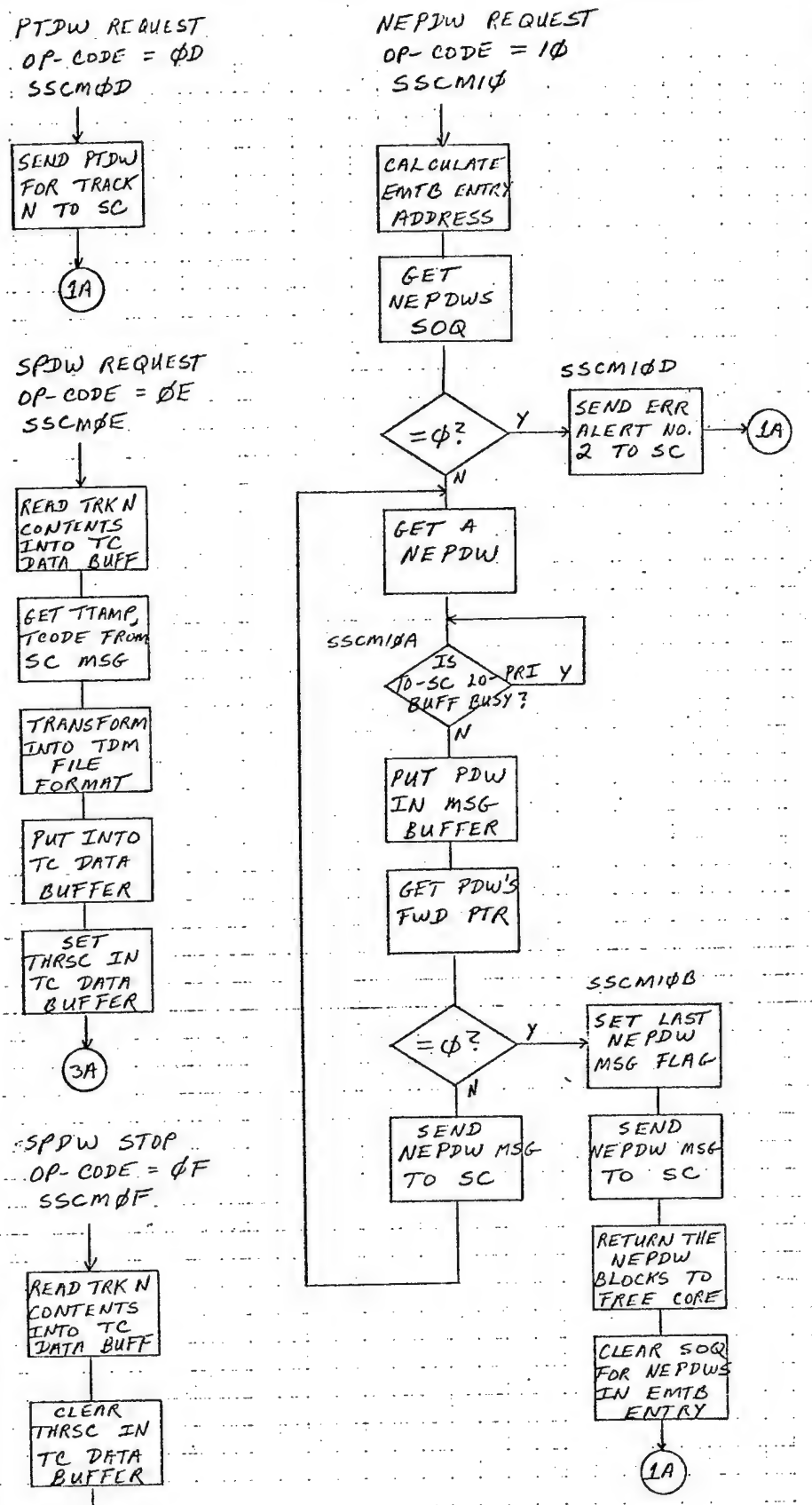
CODE IDENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 12 APR 76

NUMBER 35 | SHEET 3 OF 5

FLOW CHART

REMARKS

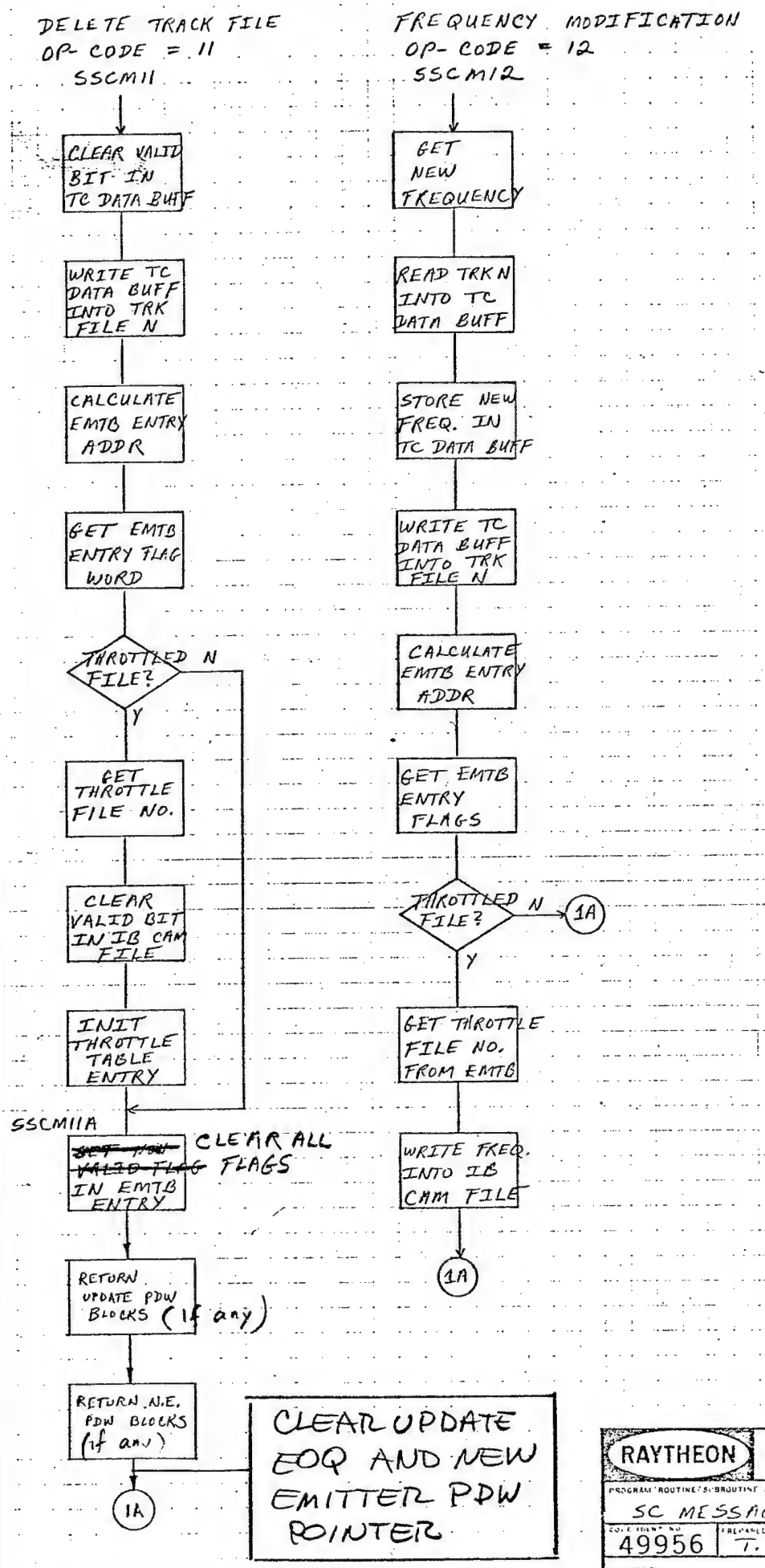
'NEPDW' MEANS 'NEW EMITTER PDW'



RAYTHEON	RAYTHEON COMPANY LEXINGTON, MASS. 02173
PROGRAM/ROUTINE SUBROUTINE ACRONYM	IEWS SORTER SUBV
	SC MESSAGE HANDLING
CODE IDENT NO: 49956	PREPARED BY: T. CHERNESKY
DATE: 13 APR 76	
NUMBER: 36	SHEET 11 OF 4

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SUPV
SC MESSAGE HANDLING

CODE IDENT NO: 49956
PREPARED BY: T. CHERNLSKY
DATE: 12 APR 76

NUMBER: 37
SHEET 5 OF 9

FLOW CHART

REMARKS

PRI MODIFICATION OF TRACK N
OP-CODE = 13
SSCM13

READ TRK N CONTENTS INTO TC DATA BUFF

GET NEW PRIA FROM SC MSG

PUT INTO TC DATA BUFFER

GET NEW PRIB

PUT INTO TC DATA BUFFER

3A

THROTTLE FILE MODIFY.
OP-CODE = 14
SSCM14

CALCULATE EMTB ENTRY ADDR

GET EMTB ENTRY FLAGS

SET THROTTLE FLAG BIT

GET THROTTLE FILE NO. FROM SC MSG

SAVE IN EMTB ENTRY

COMPUTE THROTTB ENTRY ADDR

SAVE EMITTER NO. IN THROTTB

GET REDUCT. FACTOR FROM SC MSG

SAVE IN THROTTB ENTRY

WRITE REDUCTION FACTOR INTO IB CAM

6A

6A

GET NEW FREQ. FROM SC MSG

WRITE FREQ. INTO IB CAM

GET NEW AZIMUTH FROM SC MSG

WRITE AZIMUTH AND VALID INTO IB CAM

1A

AOA THRESHOLD MODIFY.
OP-CODE = 15
SSCM15

GET TO-NESU MSG NO. (=4)

3B

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

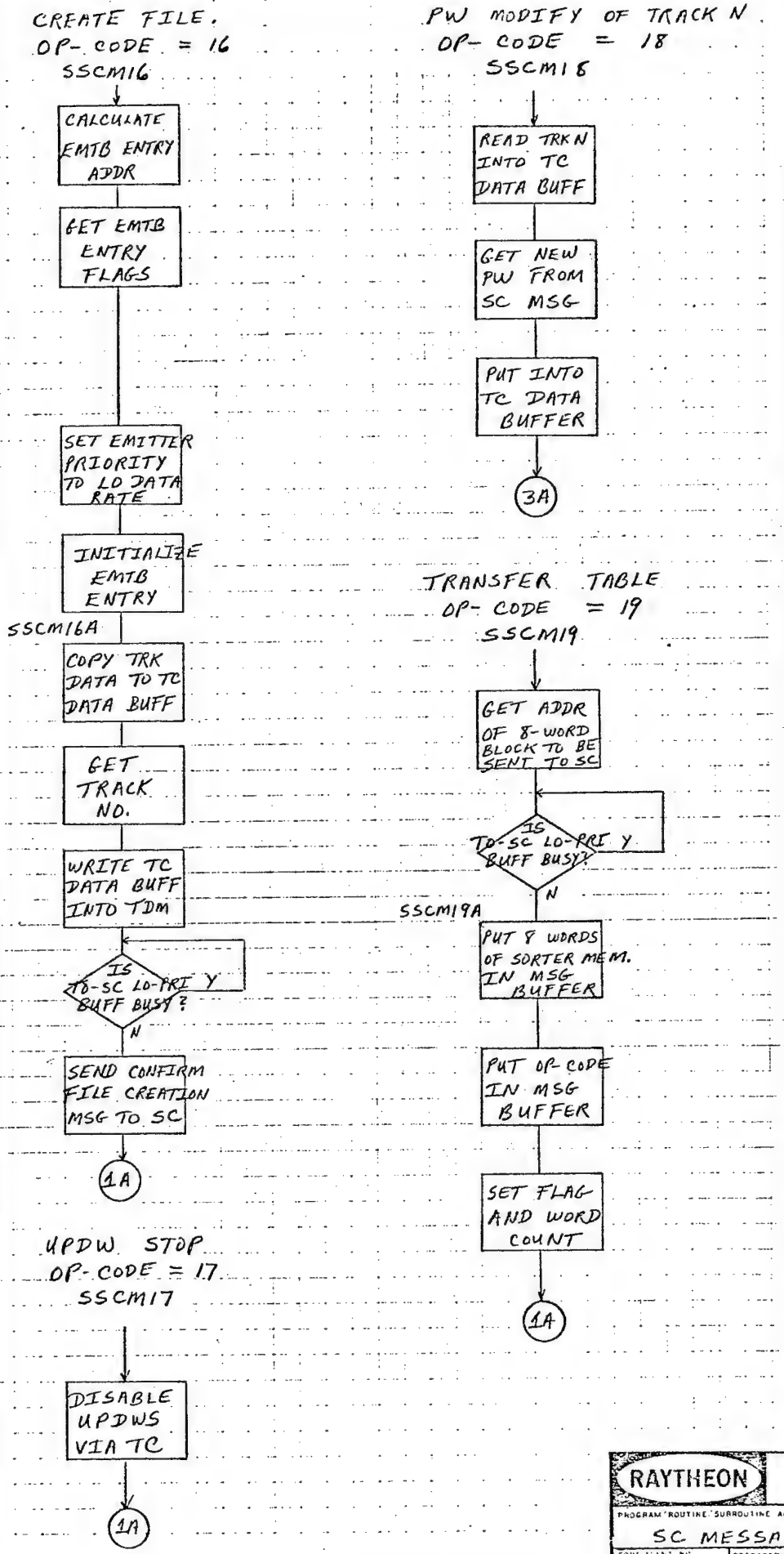
PROGRAM/ROUTINE/SUBROUTINE/ACRONYM: IEWS SORTER SUPV
SC MESSAGE HANDLING

CODE IDENT NO. 49956 | PREPARED BY T. CHERNESKY | DATE 12 APR 71

NUMBER 38 | SHEET 6 OF 6

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM IEWS SORTER SUPV

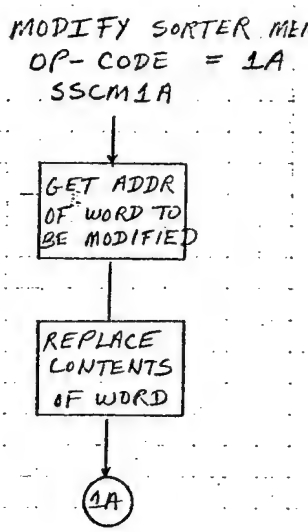
SC MESSAGE HANDLING

CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	3 JUN 76

NUMBER 39 SHEET 7 OF 8

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

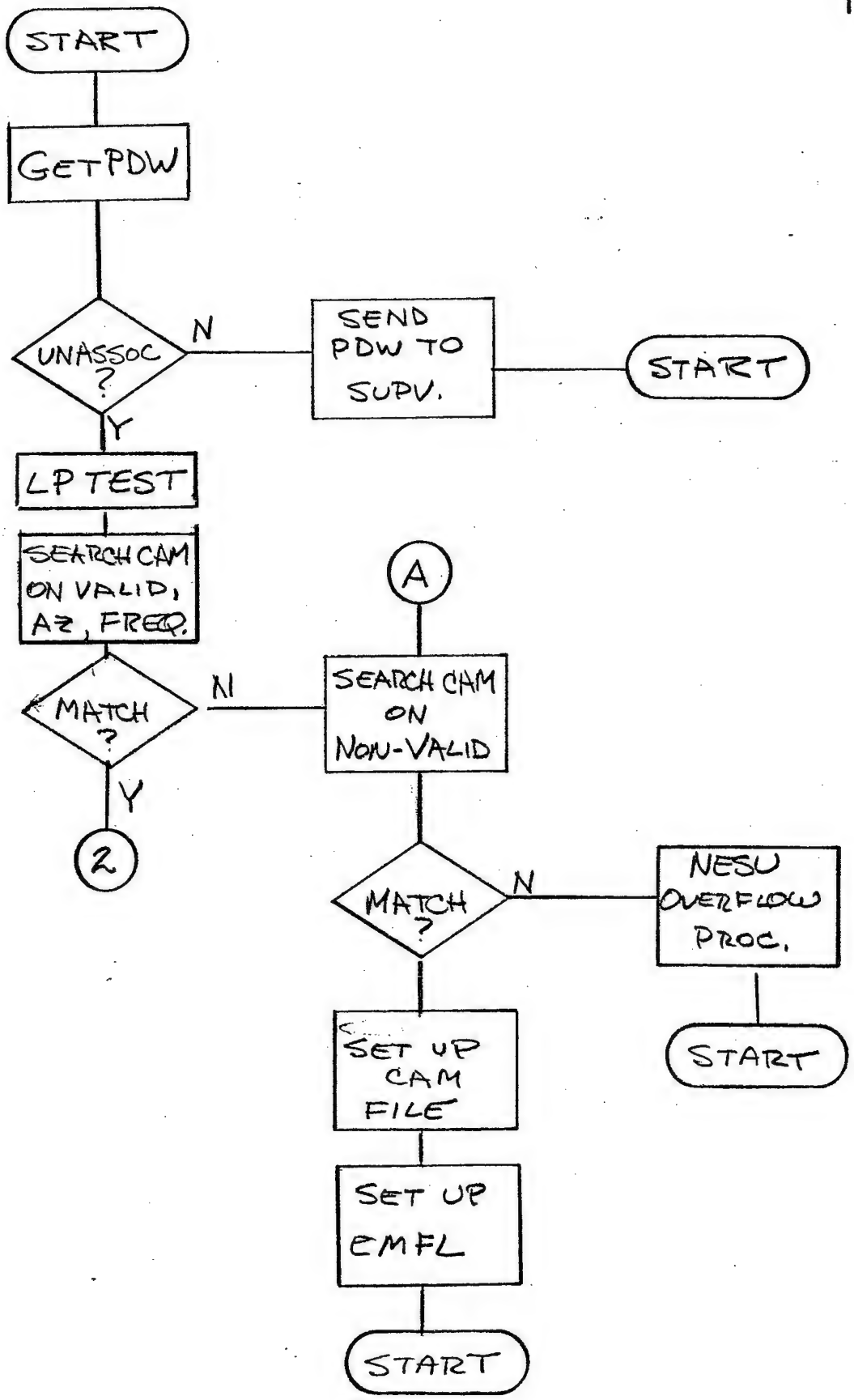
PROGRAM/ROUTINE/SUBROUTINE ACRONYM: IEWS SORTER SUPV
SC MESSAGE HANDLING

CODE IDENT NO	PREPARED BY	DATE
49956	T. CHERNESKY	12 APR 76

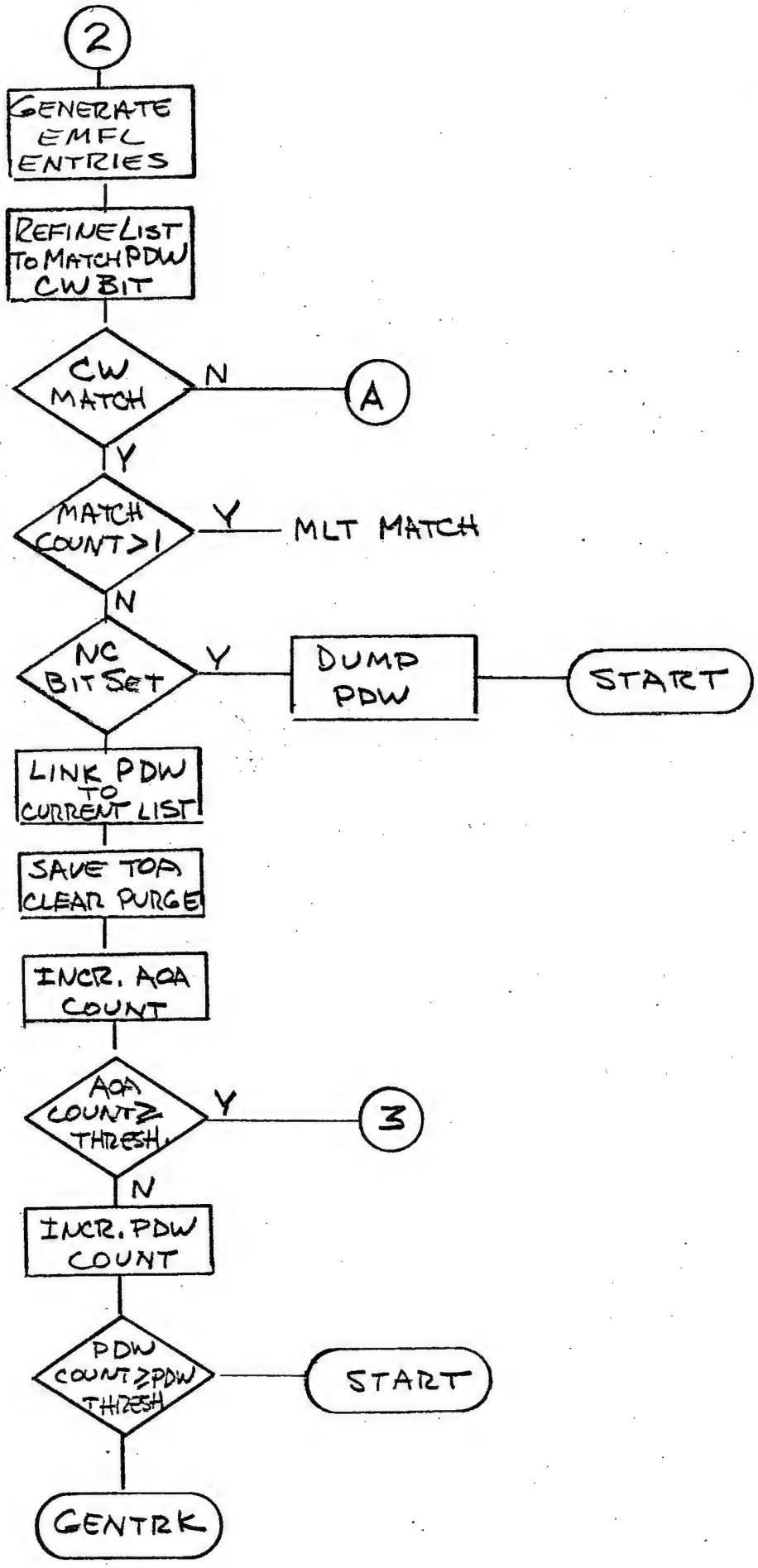
NUMBER 40 SHEET 5 OF 7

NESU

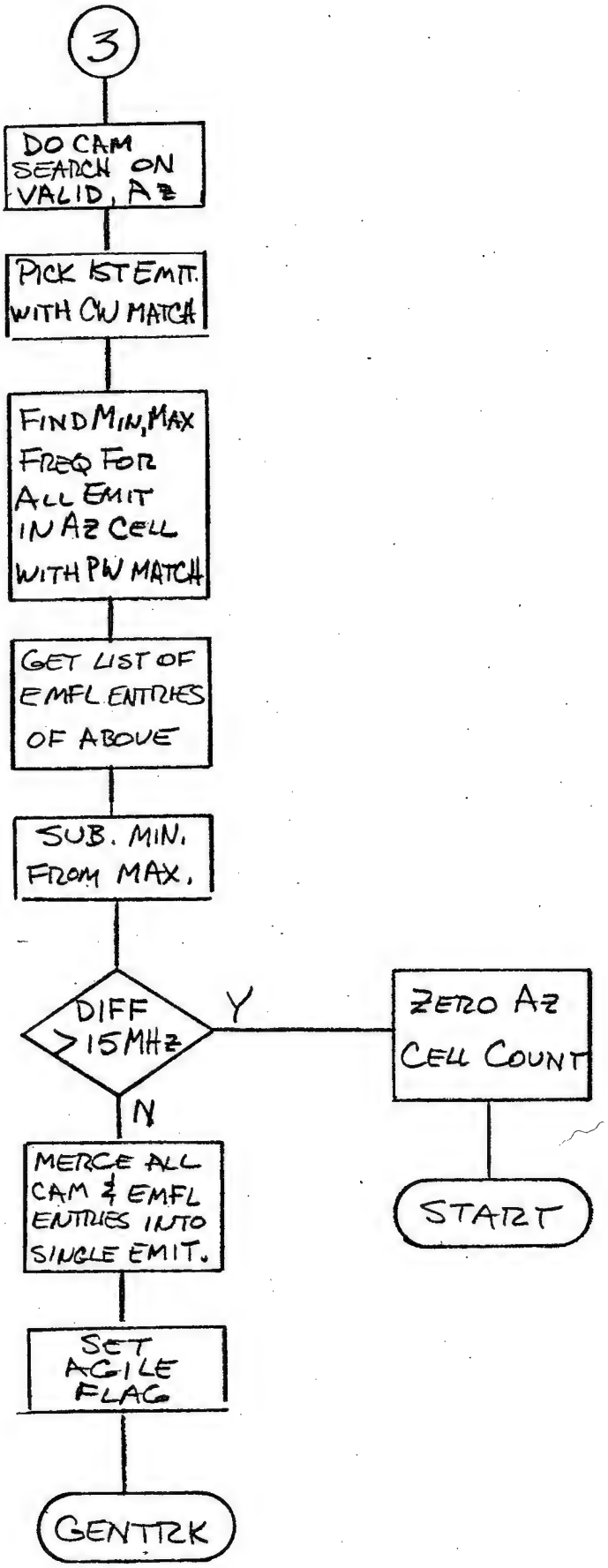
1


START
GETPDW
UNASSOC ?
N
SEND PDW TO SUPV.
START
Y
LP TEST
SEARCH CAM ON VALID, AZ, FREQ.
A
MATCH ?
N
SEARCH CAM ON NON-VALID
Y
2
MATCH ?
N
NESU OVERFLOW PROC.
START
SET UP CAM FILE
SET UP EMFL
START

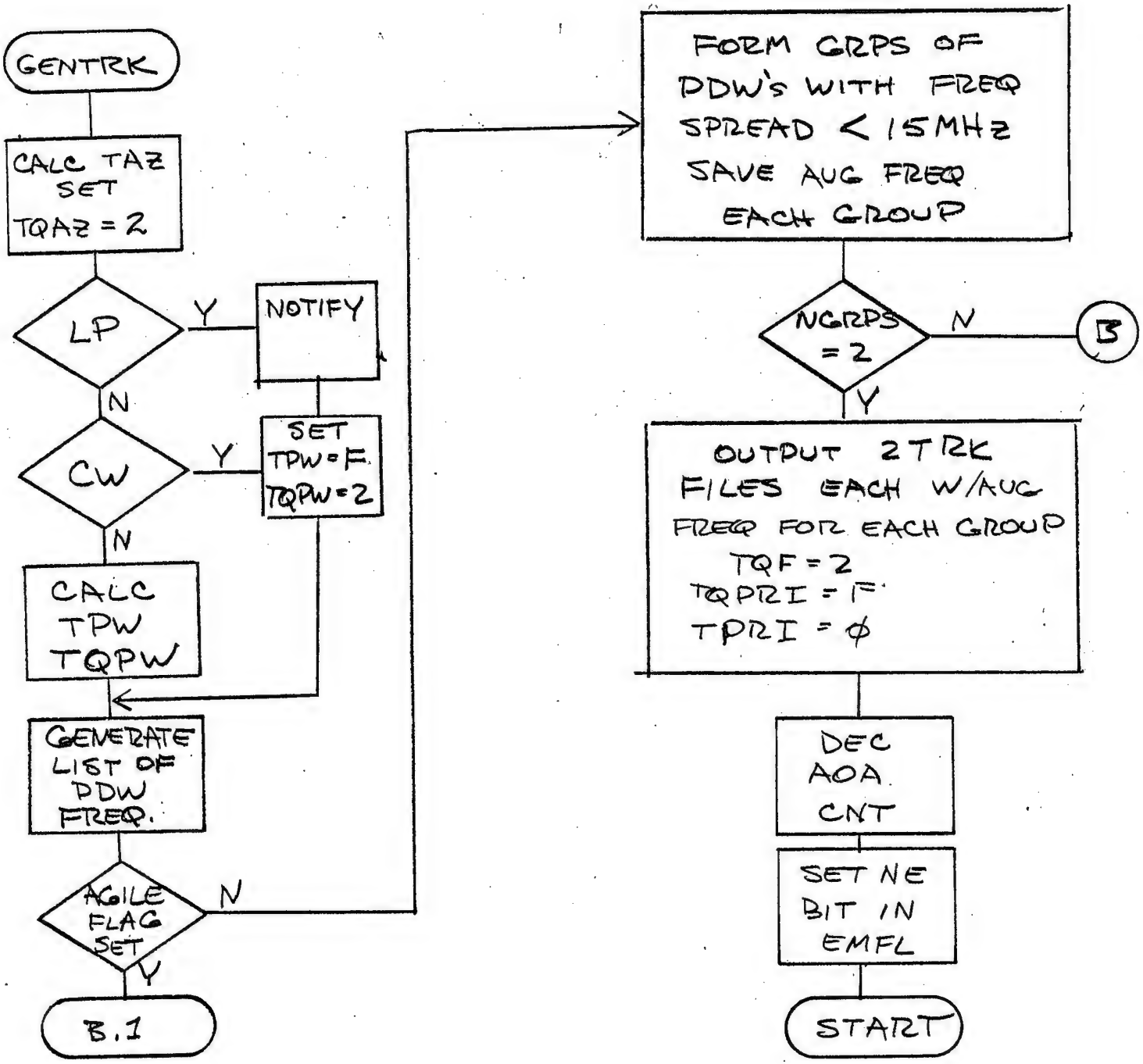
NESU
2


2
GENERATE EMFL ENTRIES
REFINE LIST TO MATCH PDW CW BIT
CW MATCH
N
A
Y
MATCH COUNT > 1
Y
MLT MATCH
N
NC BIT SET
Y
DUMP PDW
START
LINK PDW TO CURRENT LIST
SAVE TOA CLEAR PURGE
INCR. AOA COUNT
AOA COUNT ≥ THRESH.
Y
3
N
INCR. PDW COUNT
PDW COUNT ≥ PDW THRESH
START
GENTRK

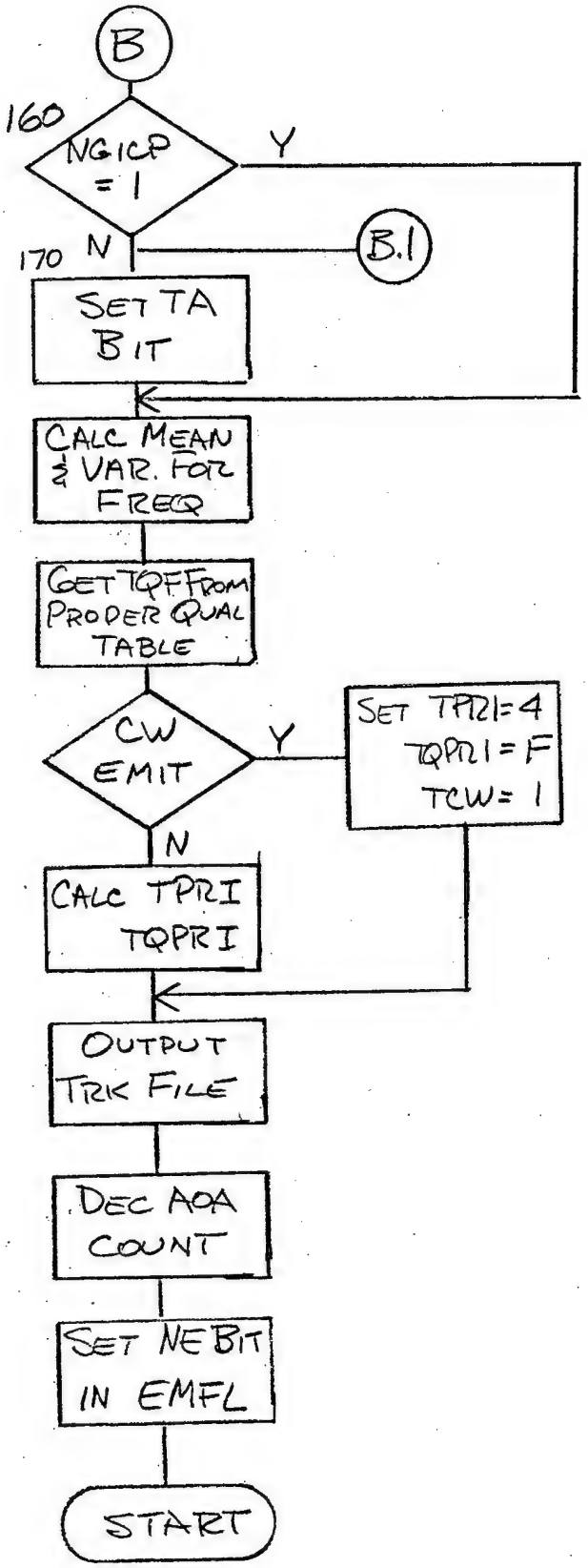
NESU
3


3
DO CAM SEARCH ON VALID, AZ
PICK 1ST EMIT. WITH CW MATCH
FIND MIN, MAX FREQ FOR ALL EMIT IN AZ CELL WITH PW MATCH
GET LIST OF EMFL ENTRIES OF ABOVE
SUB. MIN. FROM MAX.
DIFF > 15MHz
Y
ZERO AZ CELL COUNT
START
N
MERGE ALL CAM & EMFL ENTRIES INTO SINGLE EMIT.
SET AGILE FLAG
GENTRK

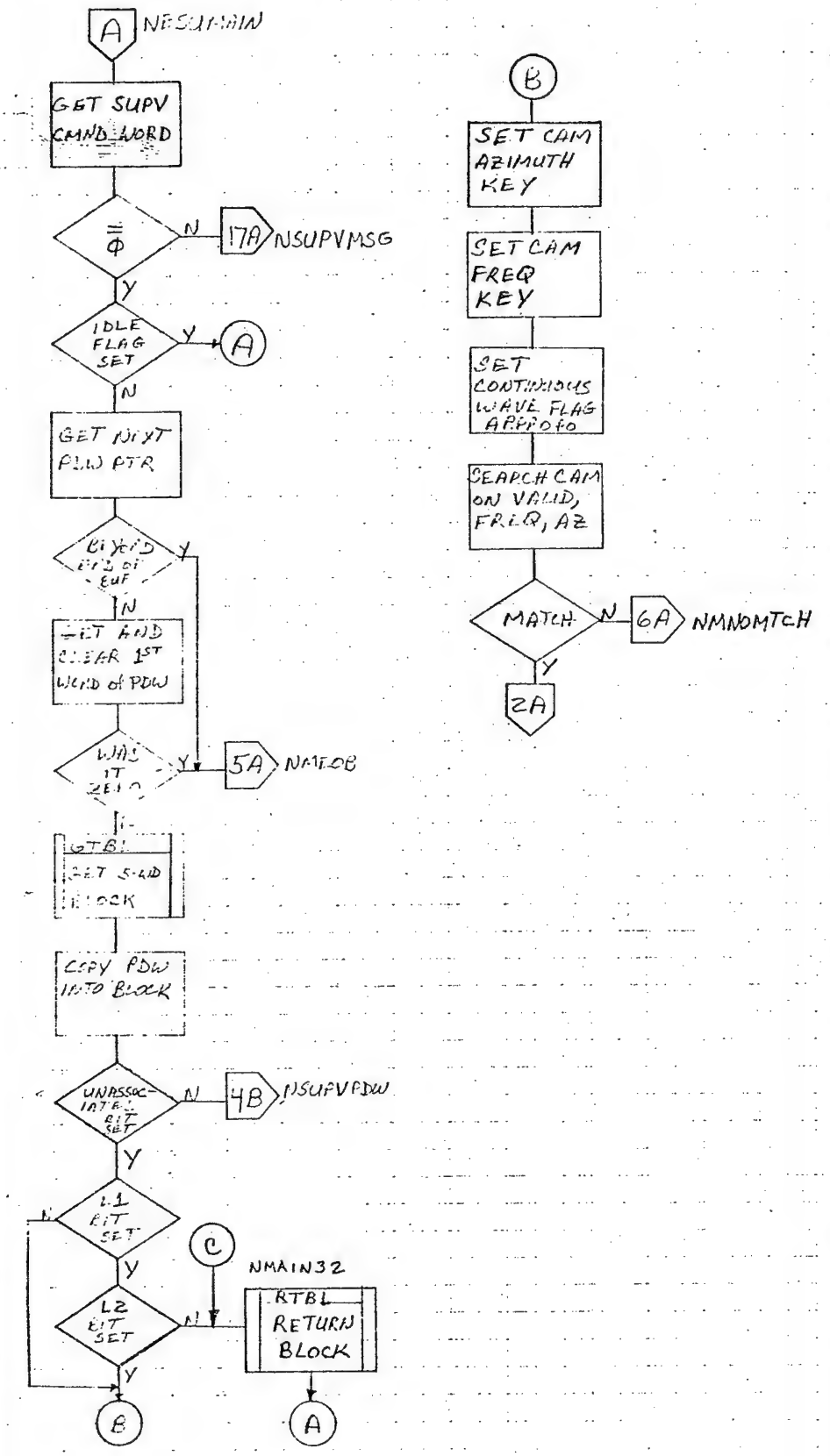
NESU
GENTRK
PROC 1



NESU
5
GENTRK
PROC 2



FLOW CHART



REMARKS

NESUMAIN IS THE ROOT OF THE NESU TREE

SUPERVISOR REQUESTS TAKE PRIORITY OVER PDW PROCESSING

MATCH RETURNS INDEX TO START OF CORRESPONDING EMFL TABLE ENTRY

ONLY THE LAST PDW DESCRIBING A LONG PULSE IS USED

NOTE: 7B DENOTES SHEET 7 LABEL B

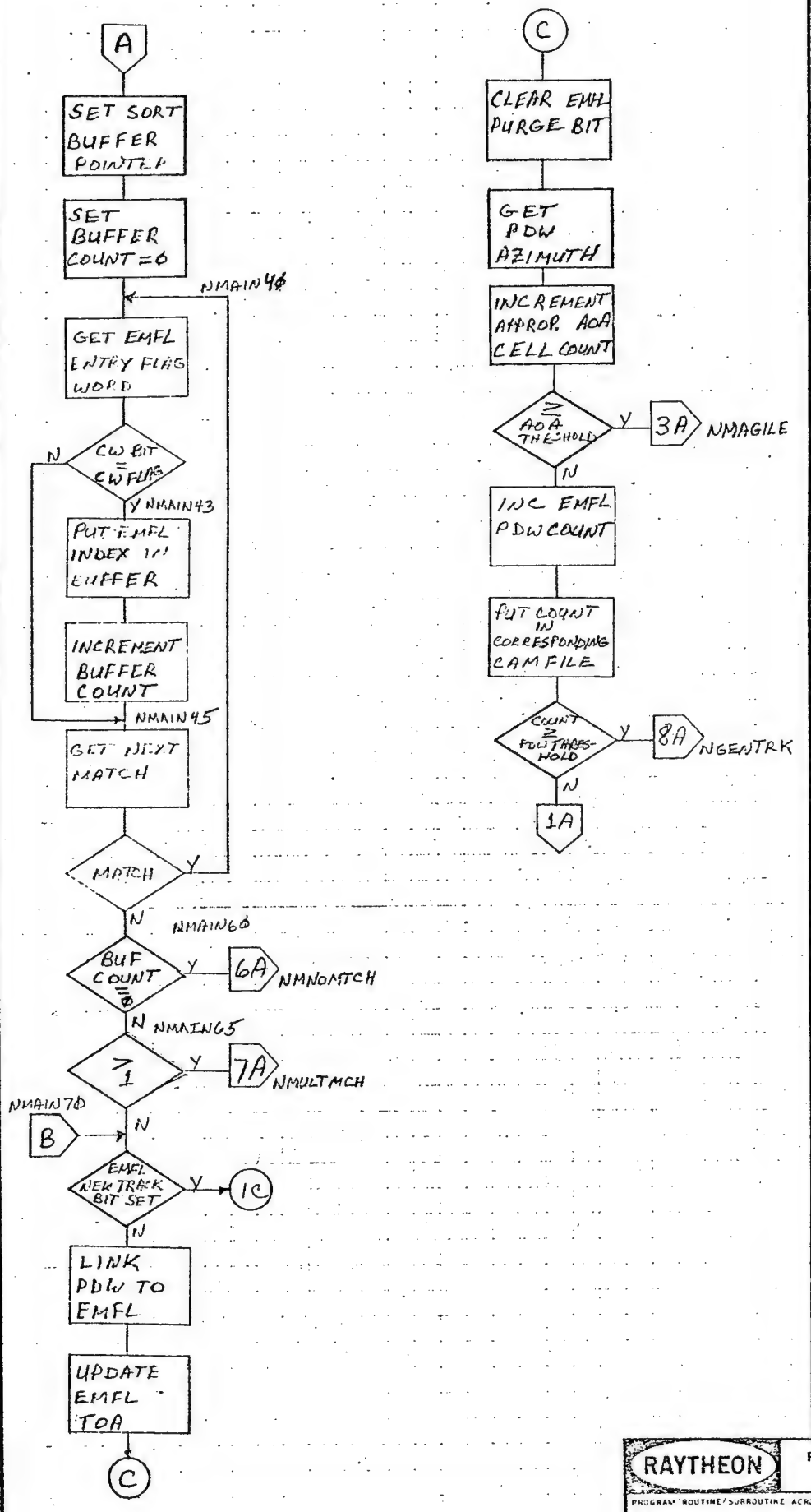
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM
LEWIS-SORTER - NESU (DETAIL)

CODE IDENT NO.	PREPARED BY	DATE
49956	G. G. DONARDO	

NUMBER MAIN SHEET 1 OF 19

FLOW CHART



REMARKS

FREQUENCY AGILE EMITTER CHECK

A PDW MATCH MUST INCLUDE AZIMUTH, FREQUENCY AND CONTINUOUS WAVE

TRTH - NUMBER OF PDW'S REQUIRED TO GENERATE NEW TRACK

IGNORE PDW MATCHING FILE RECENTLY SENT TO SUPERVISOR

EMFL TOA AND PURGE BIT ARE USED TO PURGE NOISE AND "OLD" ENTRIES

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM / ROUTINE / SUBROUTINE ACRONYM: JEWS SORTER - NESU

CODE IDENT NO: 49956

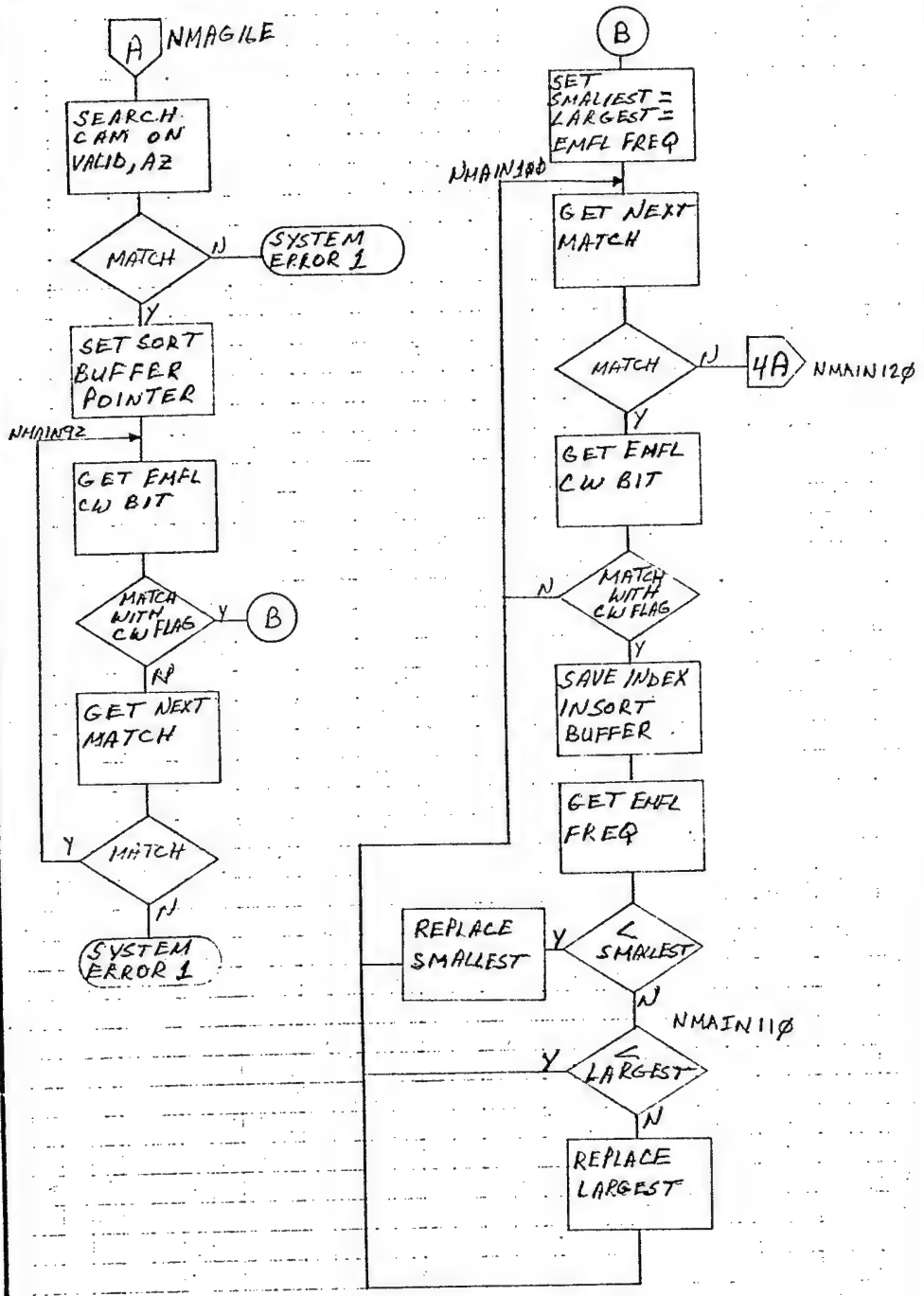
PREPARED BY:

DATE:

NUMBER: MAIN

SHEET 2 OF 19

FLOW CHART | REMARKS



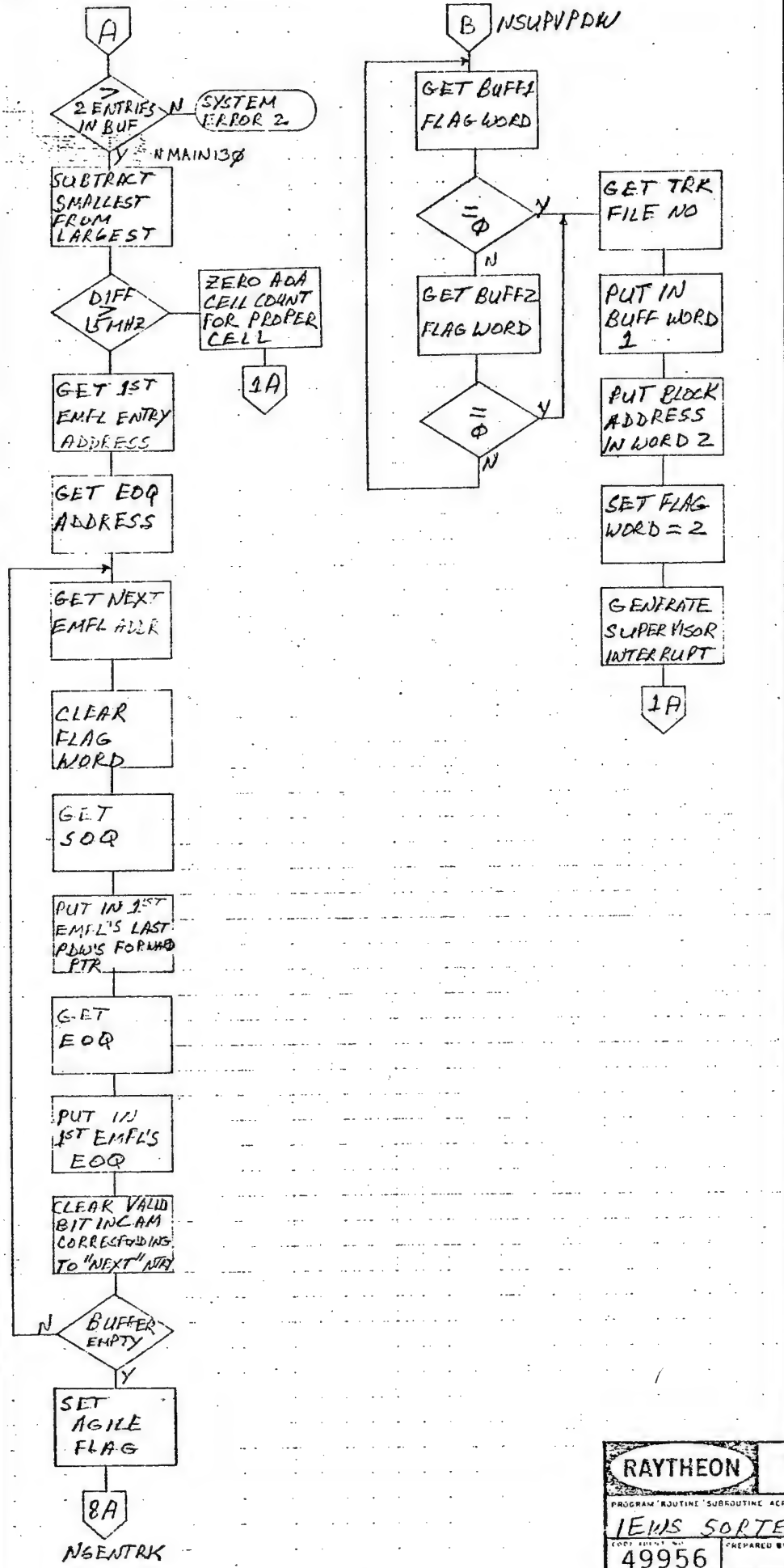
RAYTHEON | RAYTHEON COMPANY LEXINGTON, MASS. 02173

PROGRAM/ROUTINE SUBROUTINE ACRONYM: IEWS SORTER - NESU

CODE IDENT NO: 49956 | PREPARED BY | DATE

NUMBER: AGILE MERGE | SHEET 3 OF 19

FLOW CHART | REMARKS



RAYTHEON | RAYTHEON COMPANY LEXINGTON, MASS. 02173

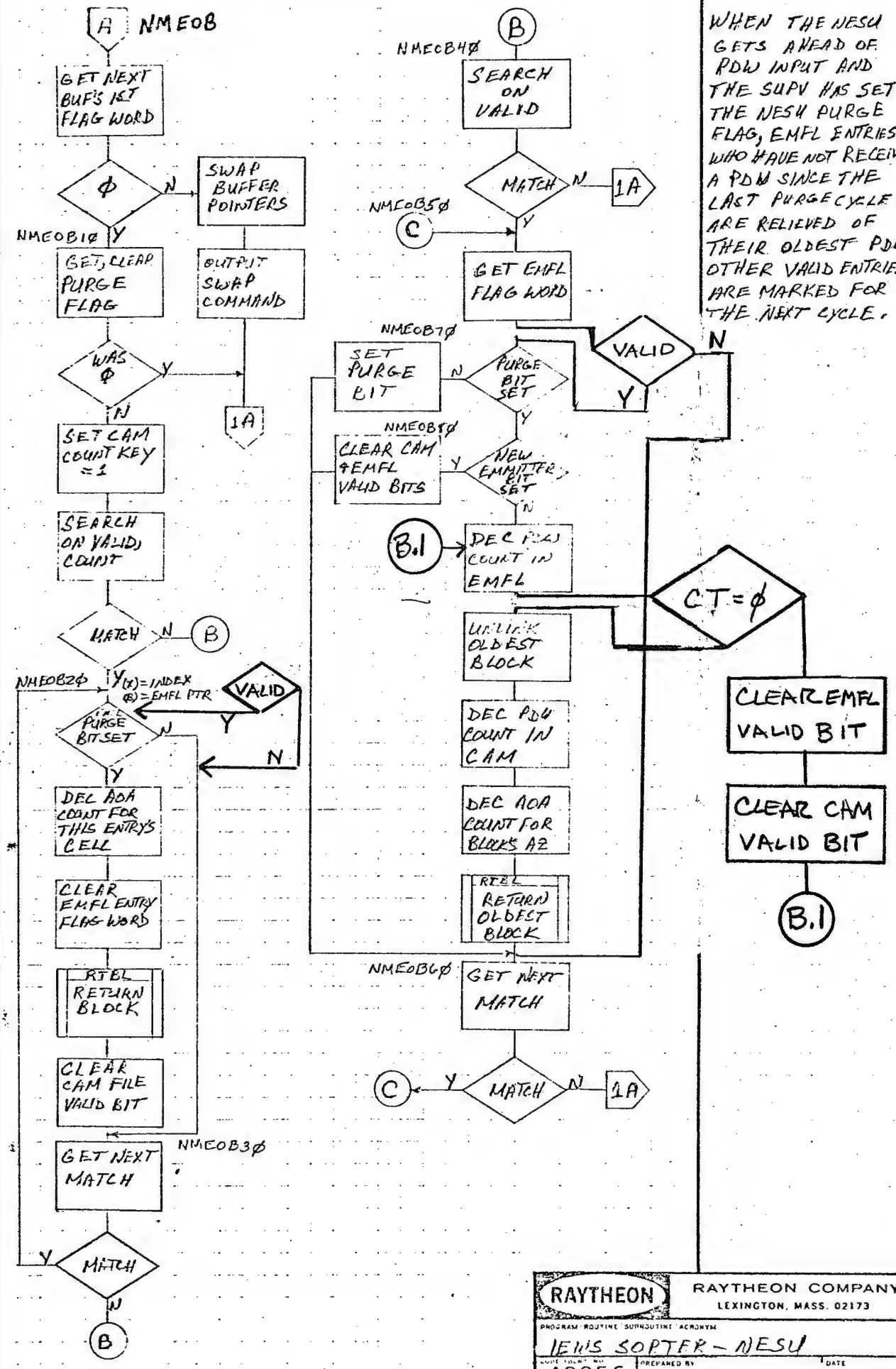
PROGRAM ROUTINE SUBROUTINE ACRONYM: IEWS SORTER – NESU

CODE IDENT NO: 49956 | PREPARED BY | DATE

NUMBER: CUPV PDW | SHEET 4 OF 19

10-2319 (8 72)

FLOW CHART



REMARKS

WHEN THE NESU GETS AHEAD OF RDW INPUT AND THE SUPV HAS SET THE NESU PURGE FLAG, EMFL ENTRIES WHO HAVE NOT RECEIVED A PDW SINCE THE LAST PURGE CYCLE ARE RELIEVED OF THEIR OLDEST PDW. OTHER VALID ENTRIES ARE MARKED FOR THE NEXT CYCLE.

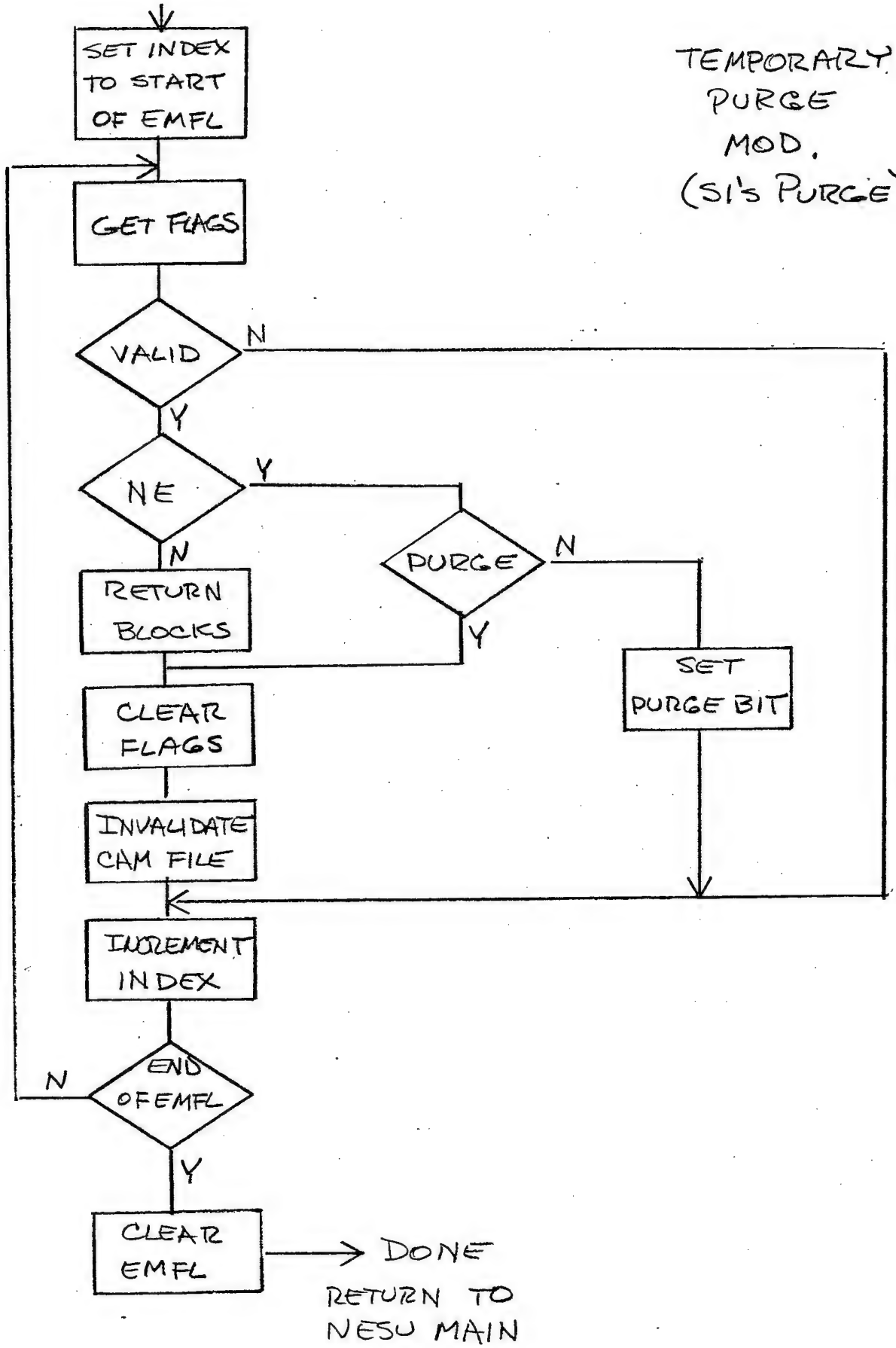
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM · ROUTINE · SUBROUTINE · ACRONYM
IEWS SOPTER – NESU

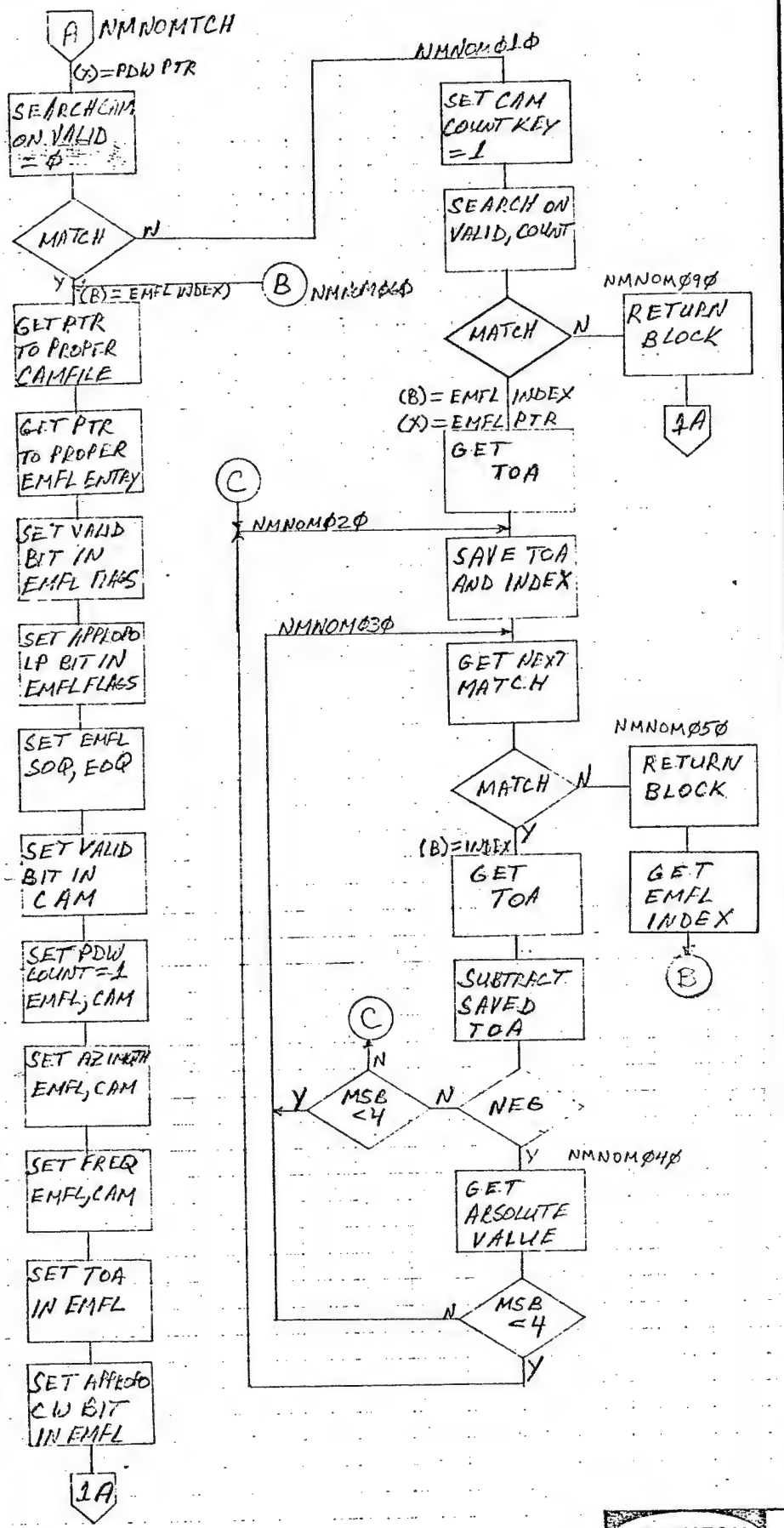
CODE IDENT. NO. 49956 | PREPARED BY | DATE

NUMBER NMEOB | SHEET 5 OF 19

TEMPORARY PURGE MOD. (SI's PURGE)



FLOW CHART | REMARKS



NO MATCH = EMFL FULL
I.E. NEW EMMITTER OVERFLOW

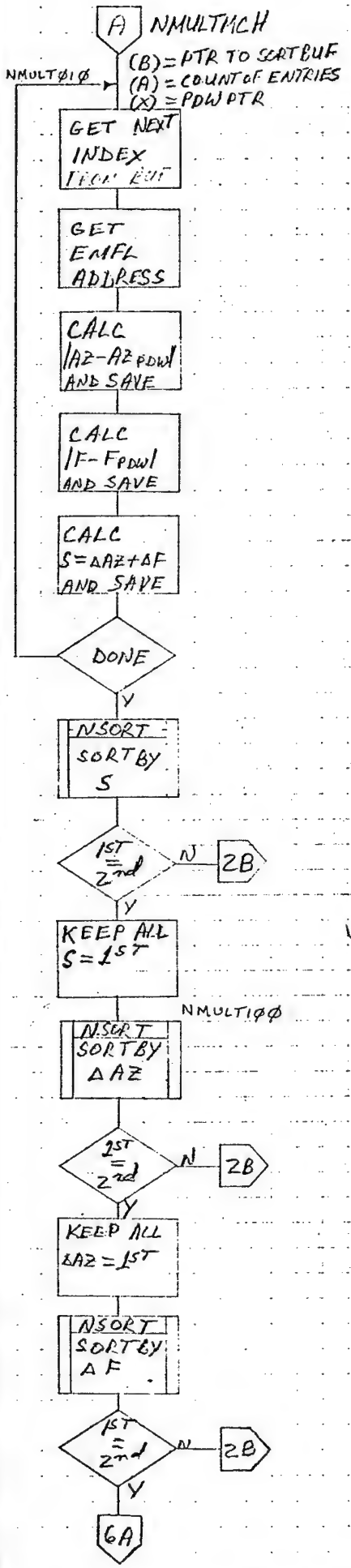
RAYTHEON | RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE SUBROUTINE ACRONYM: IEWS SORTER - NESU

CODE IDENT NO: 49956 | PREPARED BY | DATE

NUMBER: NOMATCH | SHEET 6 OF 19

FLOW CHART



REMARKS

SORTBUF ENTRIES:

WD Ø: EMFL INDEX
WD 1: ΔAZ
WD 2: ΔF
WD 3: S

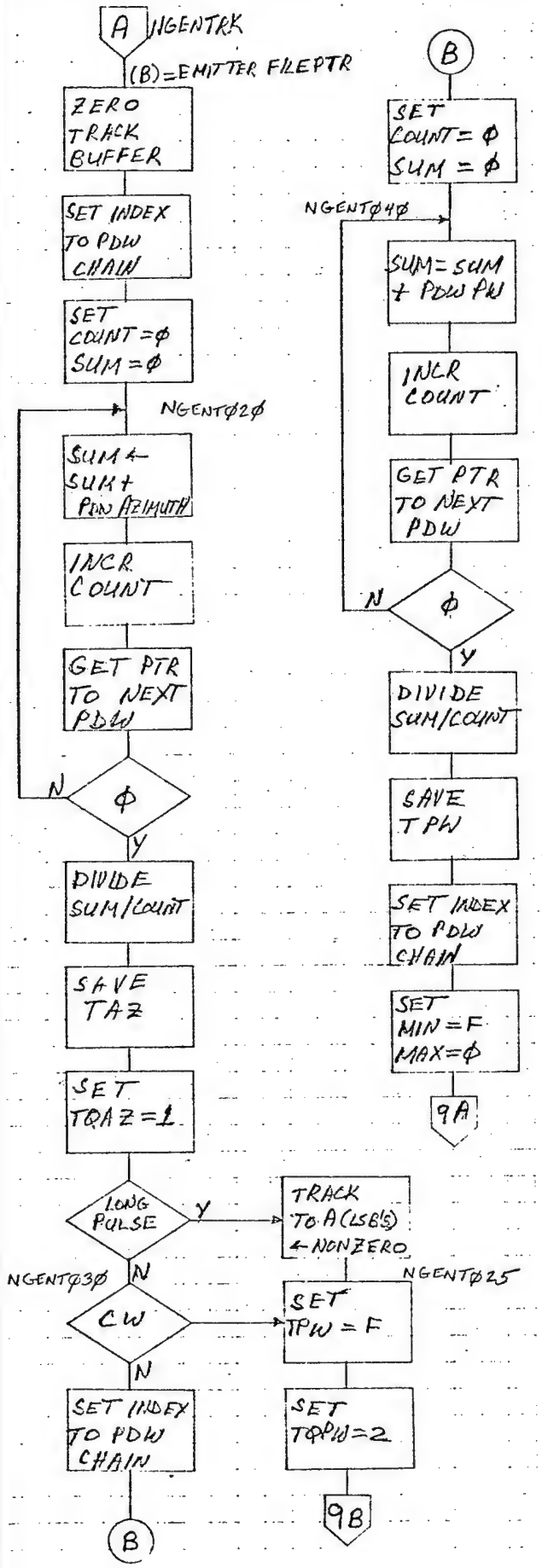
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE ACRONYM
IEWS SORTER – NESU

CODE IDENT NO. 49956 | PREPARED BY | DATE

NUMBER MULTI-MATCH | SHEET 7 OF 19

FLOW CHART



REMARKS

NON-ZERO TQA INDICATES LONG PULSE

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM/ROUTINE/SUBROUTINE/ACRONYM
IELIS SORTER – NESU

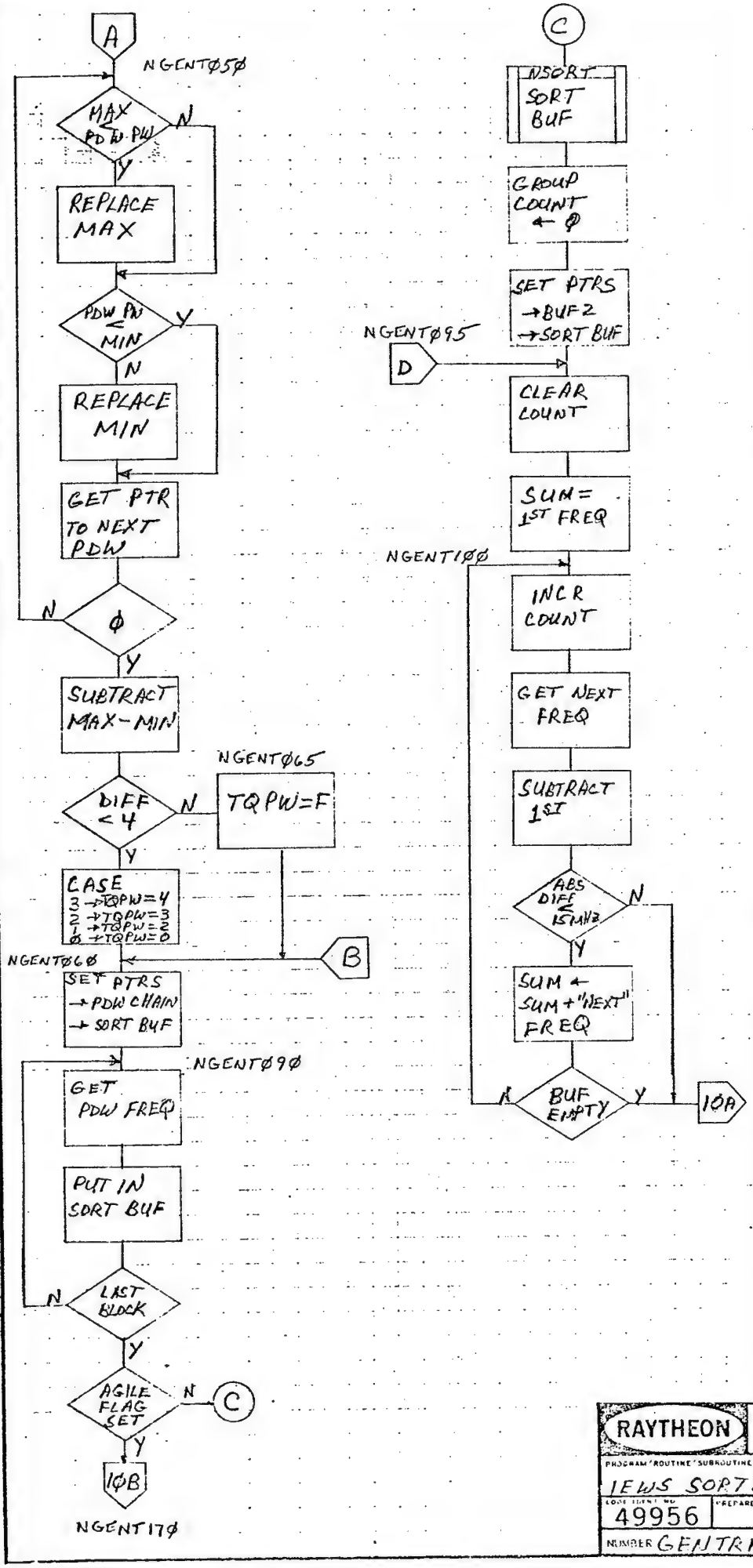
CODE IDENT NO. 49956 | PREPARED BY | DATE

NUMBER GENERATE TRACK | SHEET 8 OF 19

90-2319 (8-72)

FLOW CHART

REMARKS



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

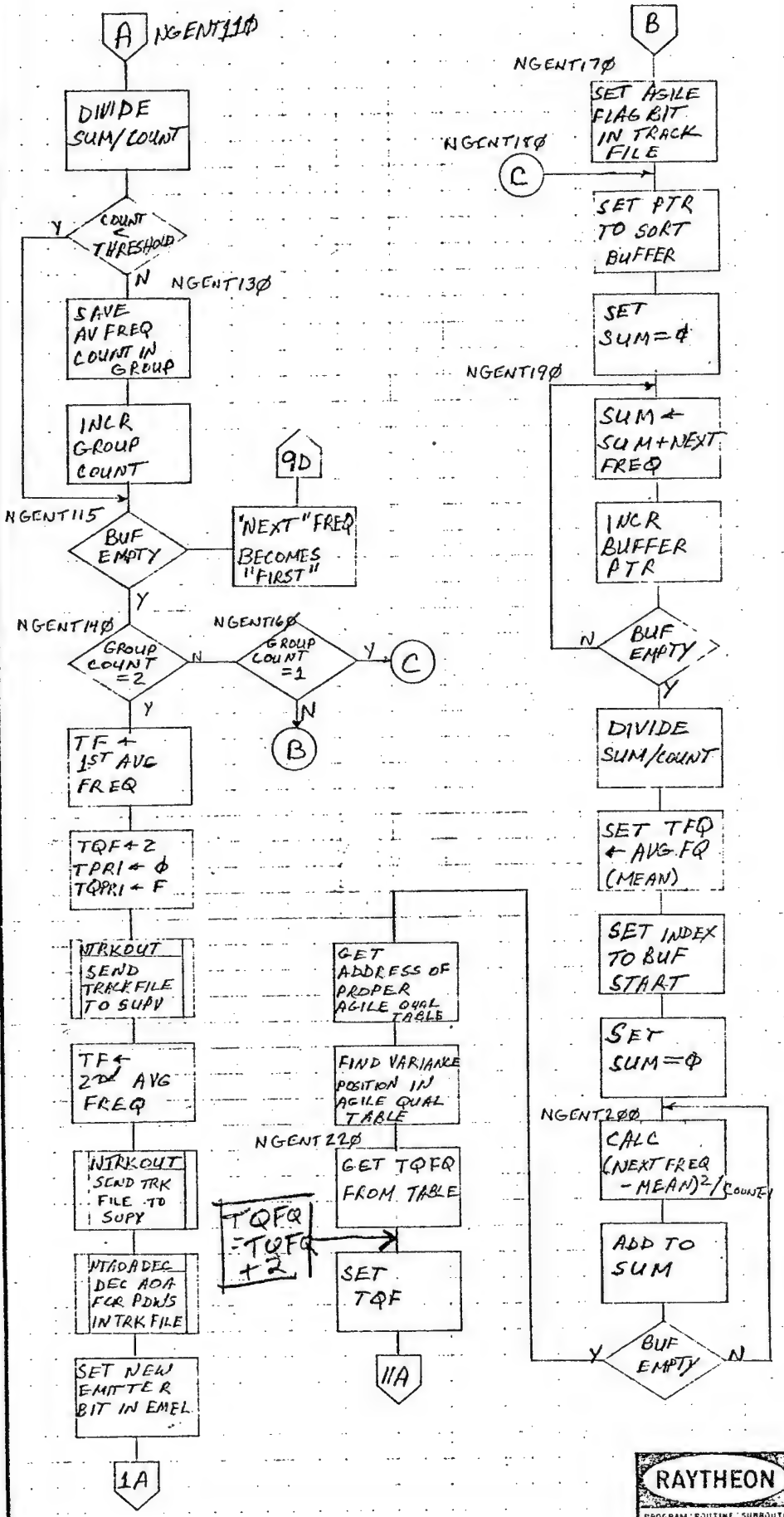
PROGRAM/ROUTINE/SUBROUTINE ACRONYM
IEWS SORTER – NESU

CODE IDENT NO 49956 | PREPARED BY | DATE

NUMBER GENTRY (cont) | SHEET 9 OF 19

10-2319 (8-72)

FLOW CHART



REMARKS

VARIANCE =

$$\frac{\sum_{1}^{N}(\text{FREQ}-\text{MEAN})^2}{(N-1)}$$

NOTE: NOT SAMPLE VARIANCE

RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM · ROUTINE · SUBROUTINE ACRONYM
IELNS SORTER – NESU

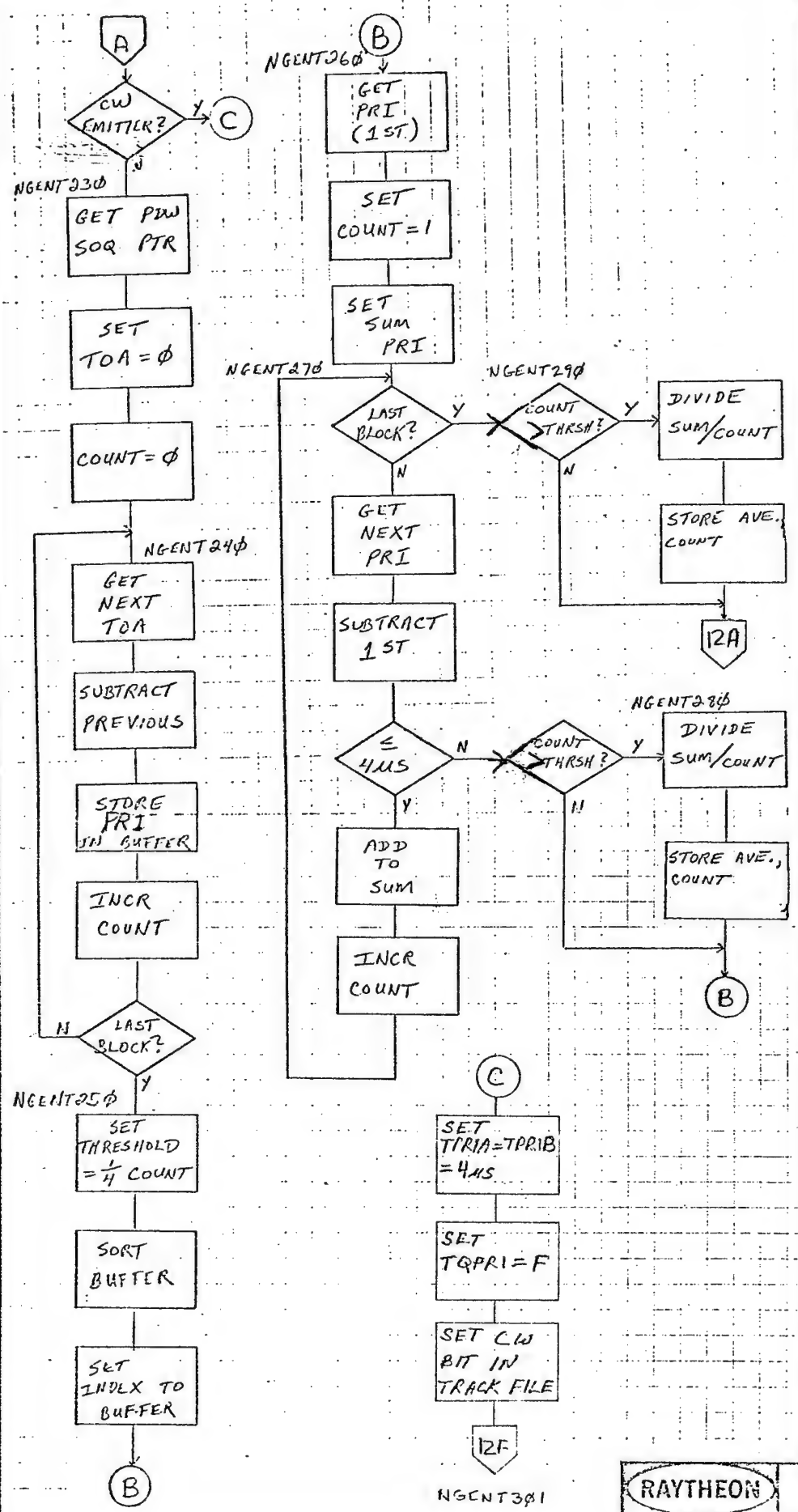
CODE IDENT NO. 49956 | PREPARED BY | DATE

NUMBER GENTIK (FREQ) | SHEET 10 OF 19

FLOW CHART

REMARKS

PRI CALCULATION



RAYTHEON COMPANY
LEXINGTON, MASS. 02173

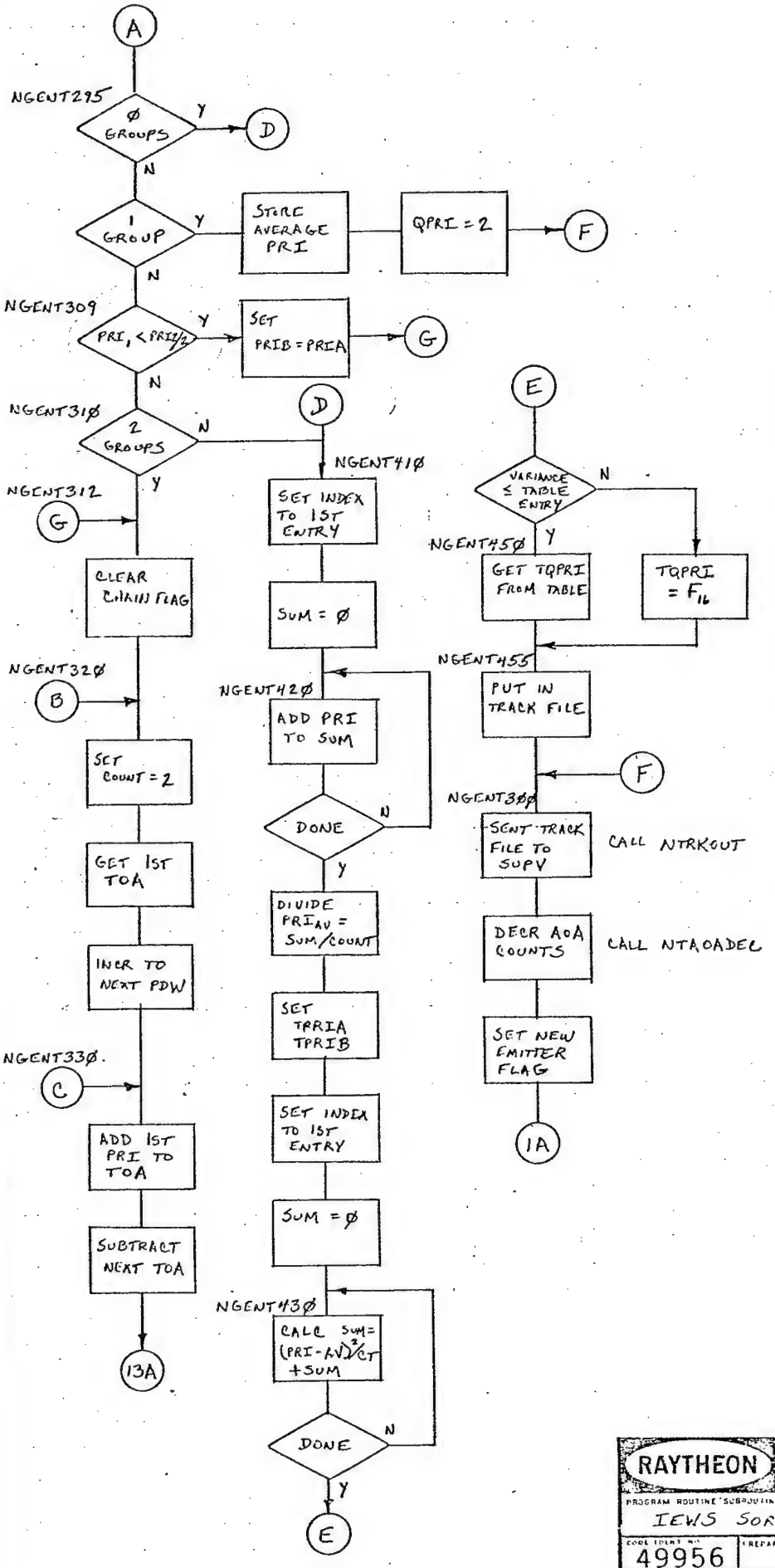
IEWS SORTER- NESU

CODE IDENT NO 49956

NUMBER GEN TRK

SHEET 11 OF 19

FLOW CHART



REMARKS

PRI CALCULATION CHAINING AND VARIANCE

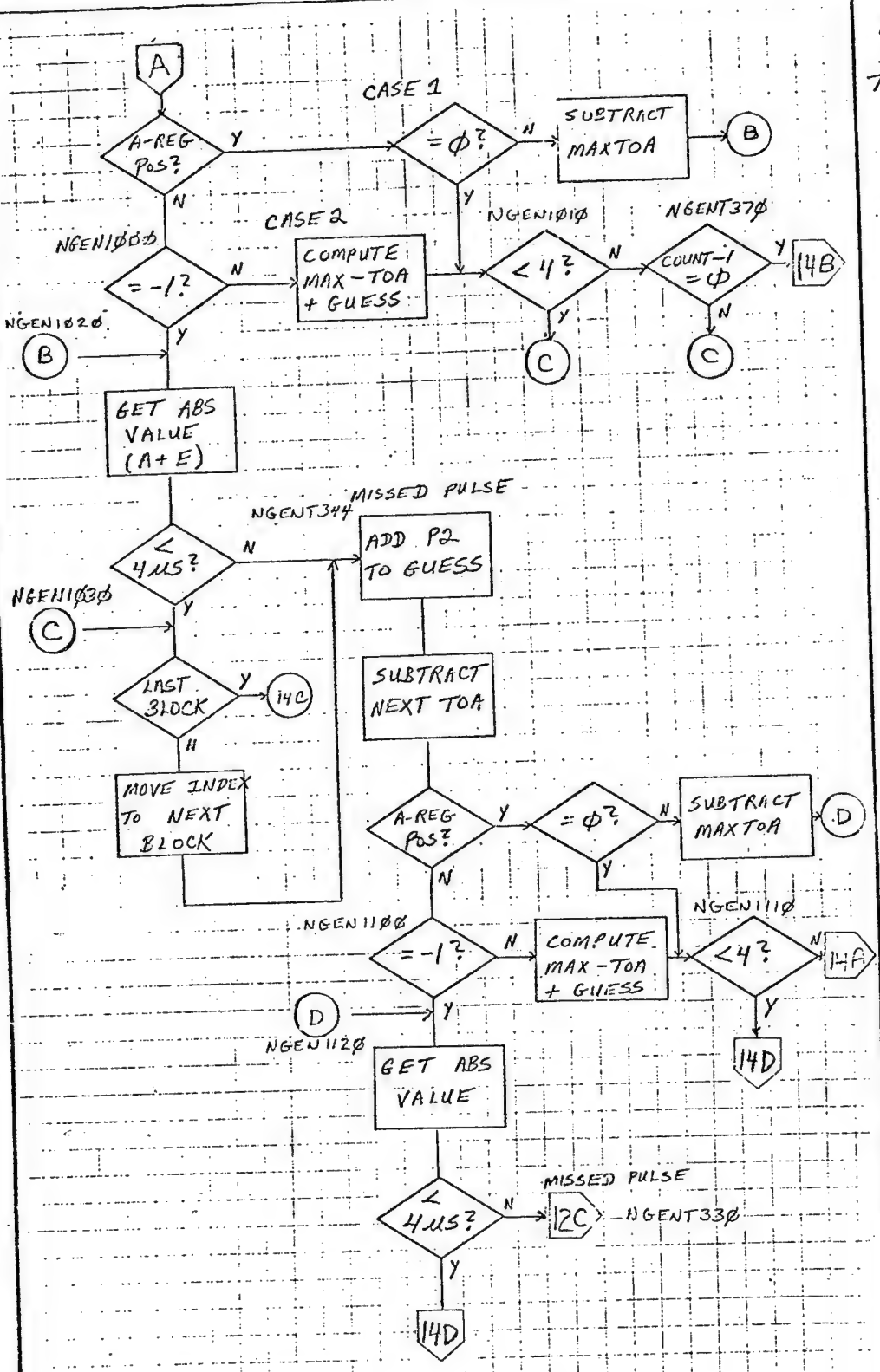
RAYTHEON COMPANY
LEXINGTON, MASS. 02173

PROGRAM ROUTINE/SUBROUTINE ACRONYM
IEWS SORTER - NESU

CODE IDENT NO. 49956 | PREPARED BY | DATE

NUMBER | SHEET 12 OF 19

FLOW CHART



CASE 1 : GUESS = MAX-N N = Ø, 1, 2, 3
ACTUAL = M M = 3, 2, 1, Ø

GUESS - ACTUAL = LARGE POS NO., I.E., MAX-N-M > 2^{16}
THEREFORE, NEED N+M < 4, ELSE POSSIBLE MISSED PULSE.
IF A-REG POS AND NON-ZERO, THEN COMP((GUESS-ACT)-MAX) = N+M

CASE 2 : GUESS = M M = Ø, 1, 2, 3
ACTUAL = MAX - N N = 3, 2, 1, Ø
GUESS - ACTUAL = LARGE NEG. NO., M - MAX - N
THEREFORE, N+M < 4, ELSE ERROR.
IF A NEG AND A ≠ -1, THEN
MAX - ACT + GUESS = MAX - (MAX-N) + M = N+M

REMARKS

PRI CHAIN CALCULATION - TOA WRAPAROUND PROBLEM

MAXTOA = constant = 100000_{16}

P1 is first avg PRI

P2 is 2nd avg PRI

PRI chaining is an attempt to search for dual stagger PRI

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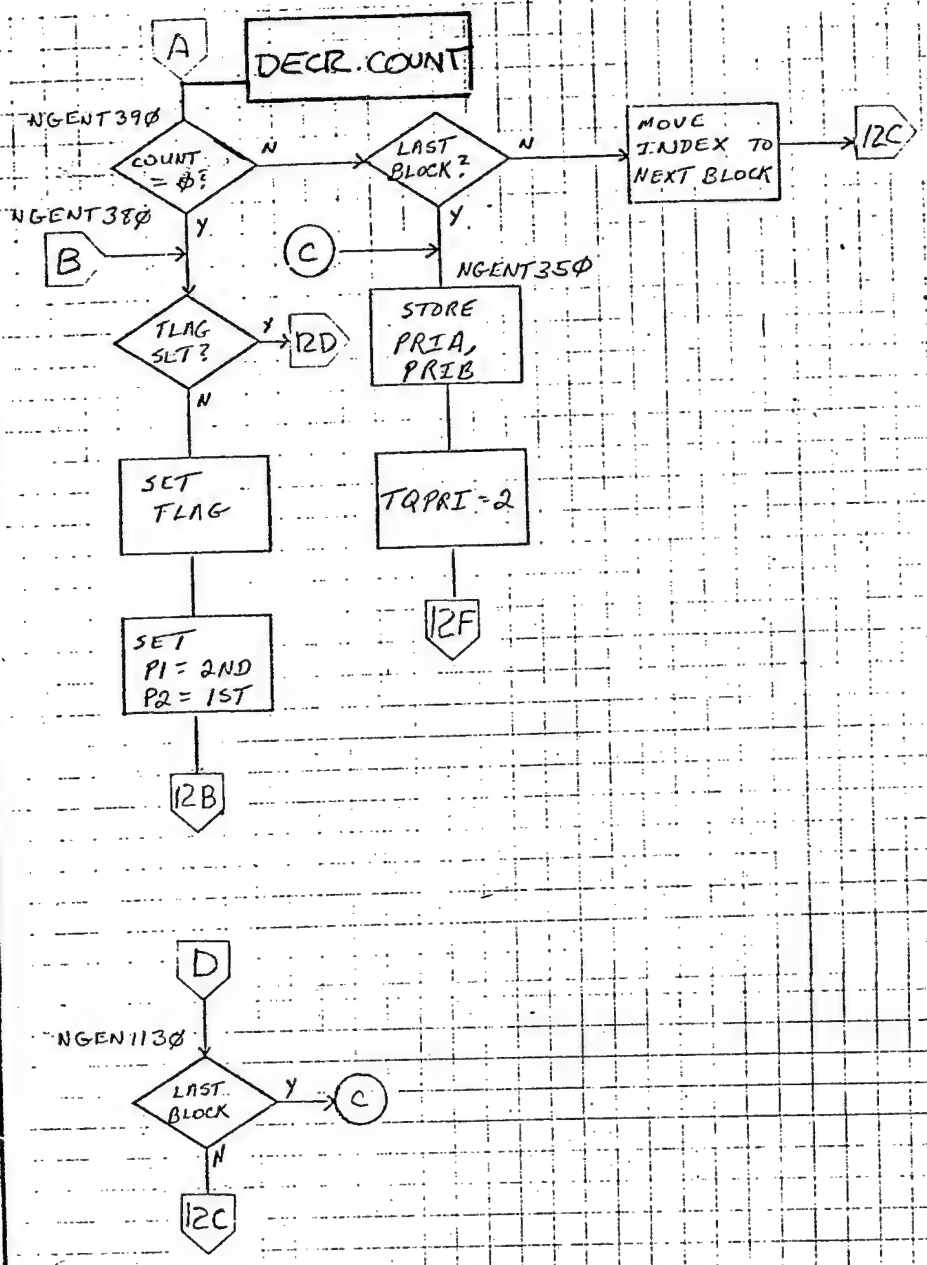
PROGRAM TITLE OR ACRONYM
IEWS SORTER - NESU

LOGIC DIAGRAM NO.
49956

NUMBER

SHEET 13 OF 19

FLOW CHART



REMARKS

PRI CHAIN CALCULATION

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PROGRAM / ROUTINE / SUBROUTINE / ACRONYM
IEWS SORTER - NESU

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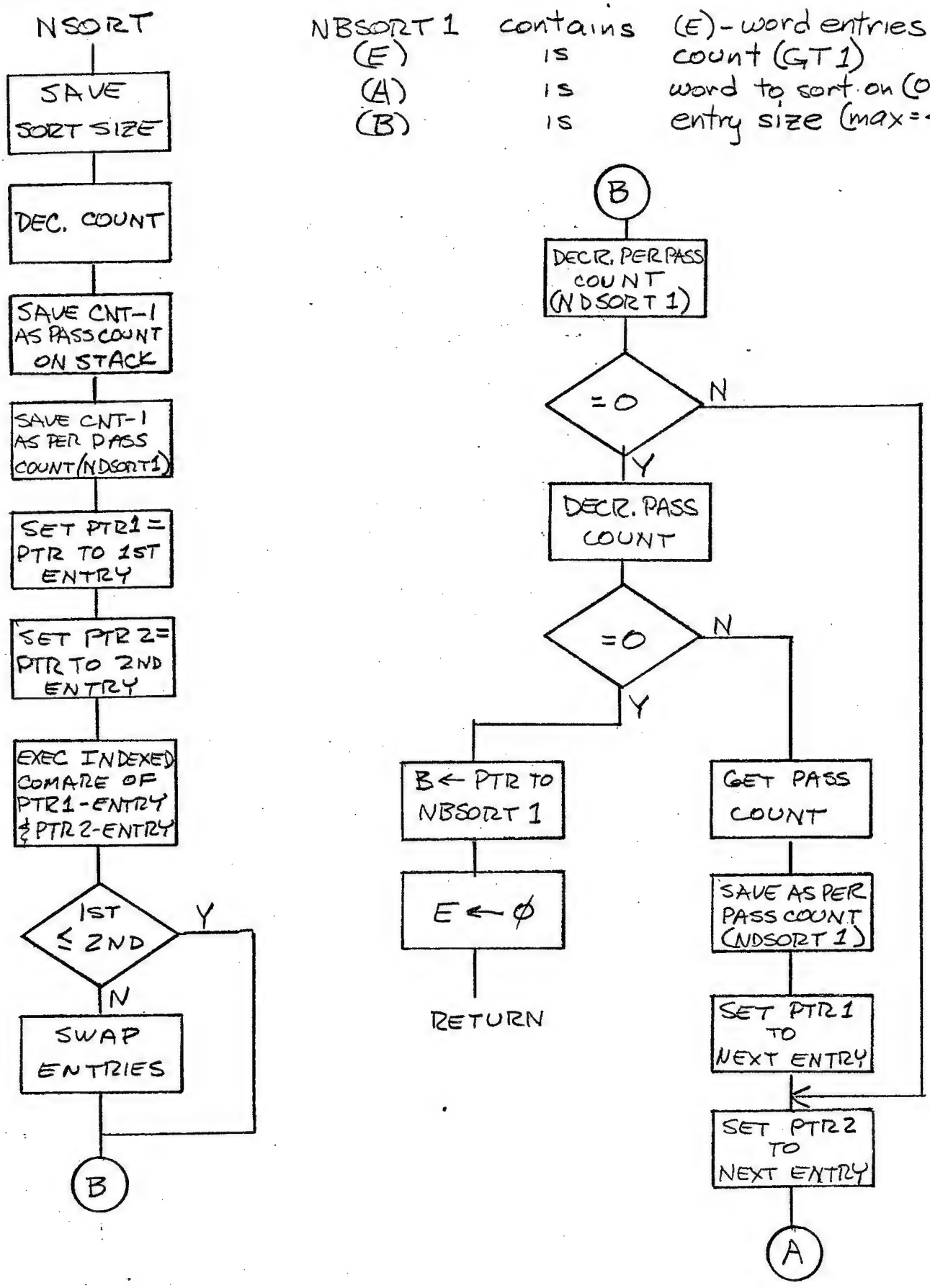
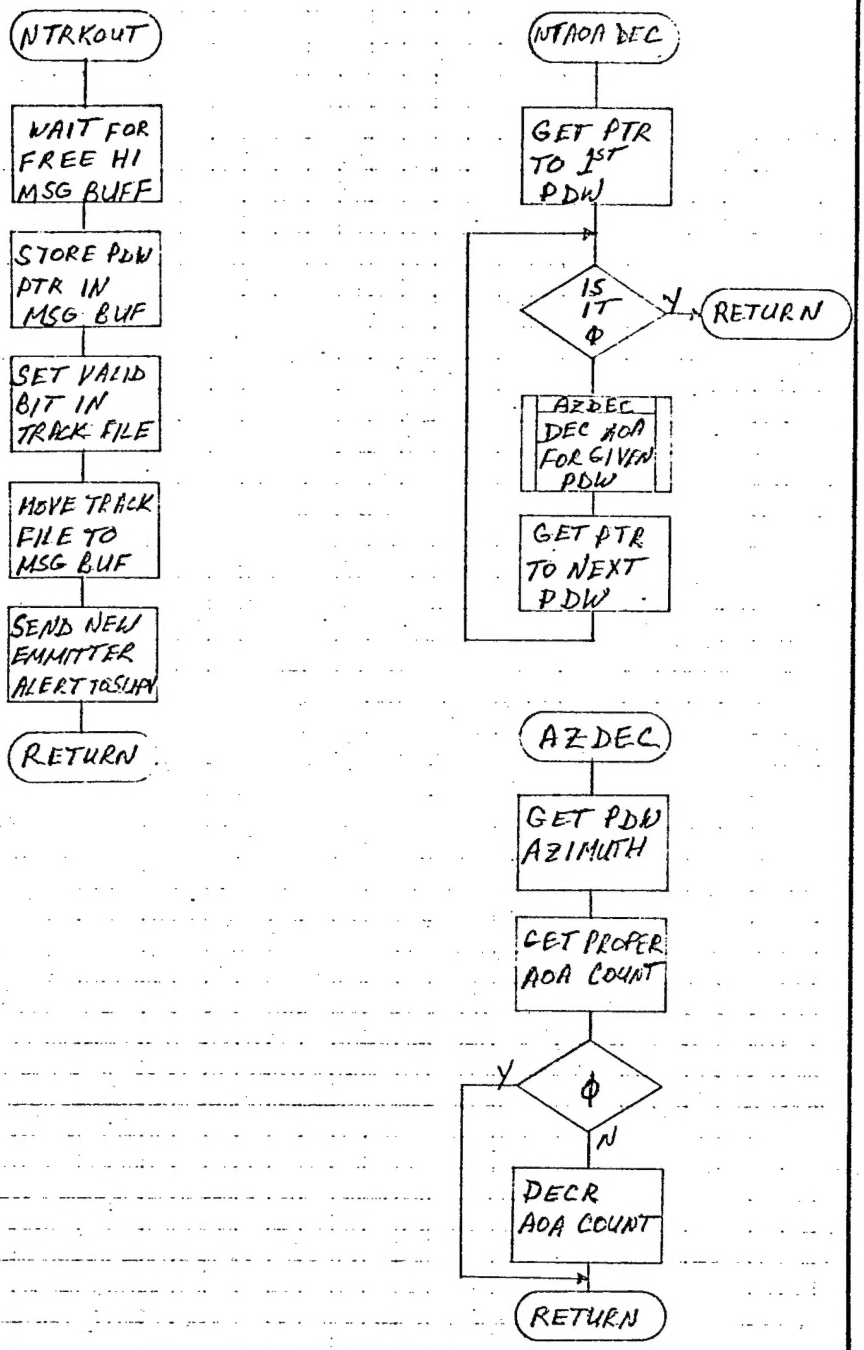
SHEET 14 OF 10

10-2219 9 72


NSORT
SAVE SORT SIZE
DEC. COUNT
SAVE CNT-1 AS PASS COUNT ON STACK
SAVE CNT-1 AS PER PASS COUNT (NDSORT1)
SET PTR1 = PTR TO 1ST ENTRY
SET PTR2 = PTR TO 2ND ENTRY
EXEC INDEXED COMARE OF PTR1-ENTRY & PTR2-ENTRY
1ST ≤ 2ND
Y
N
SWAP ENTRIES
B
NBSORT 1 contains (E)-word entries
(E) is count (GT 1)
(A) is word to sort on (0-3)
(B) is entry size (max=4)
B
DECR. PER PASS COUNT (NDSORT 1)
=0
N
Y
DECR. PASS COUNT
=0
N
Y
B ← PTR TO NBSORT 1
E ← ∅
RETURN
GET PASS COUNT
SAVE AS PER PASS COUNT (NDSORT 1)
SET PTR1 TO NEXT ENTRY
SET PTR2 TO NEXT ENTRY
A

FLOW CHART



REMARKS

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PROGRAM/ROUTINE/SUBROUTINE ACRONYM
LEWIS SORTER – NESU

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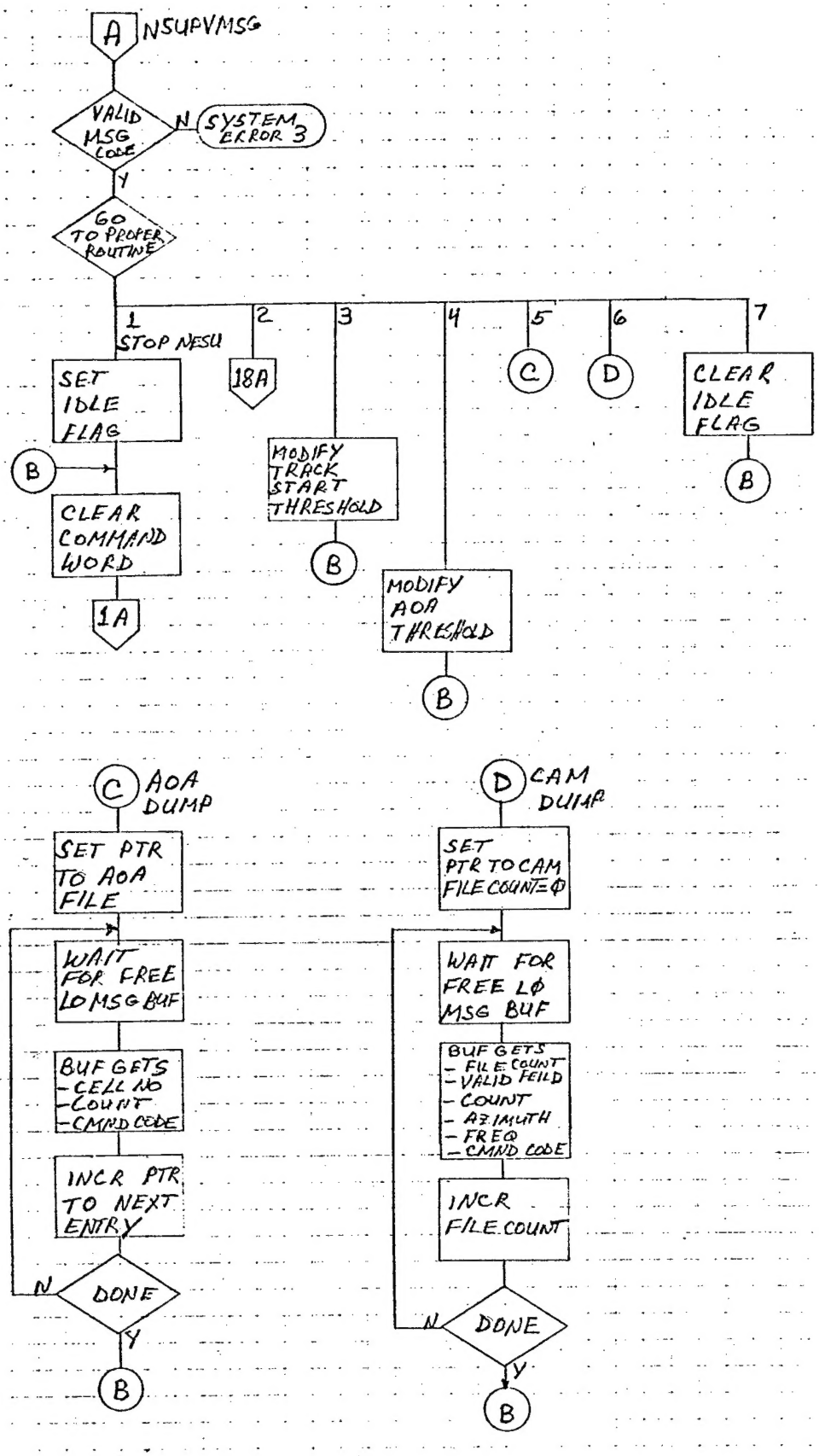
NUMBER GEN TRK ROUTINES | SHEET 16 OF 19

FLOW CHART

REMARKS



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PROGRAM ROUTINE/SUBROUTINE ACRONYM
IEWS SORTER - NESU

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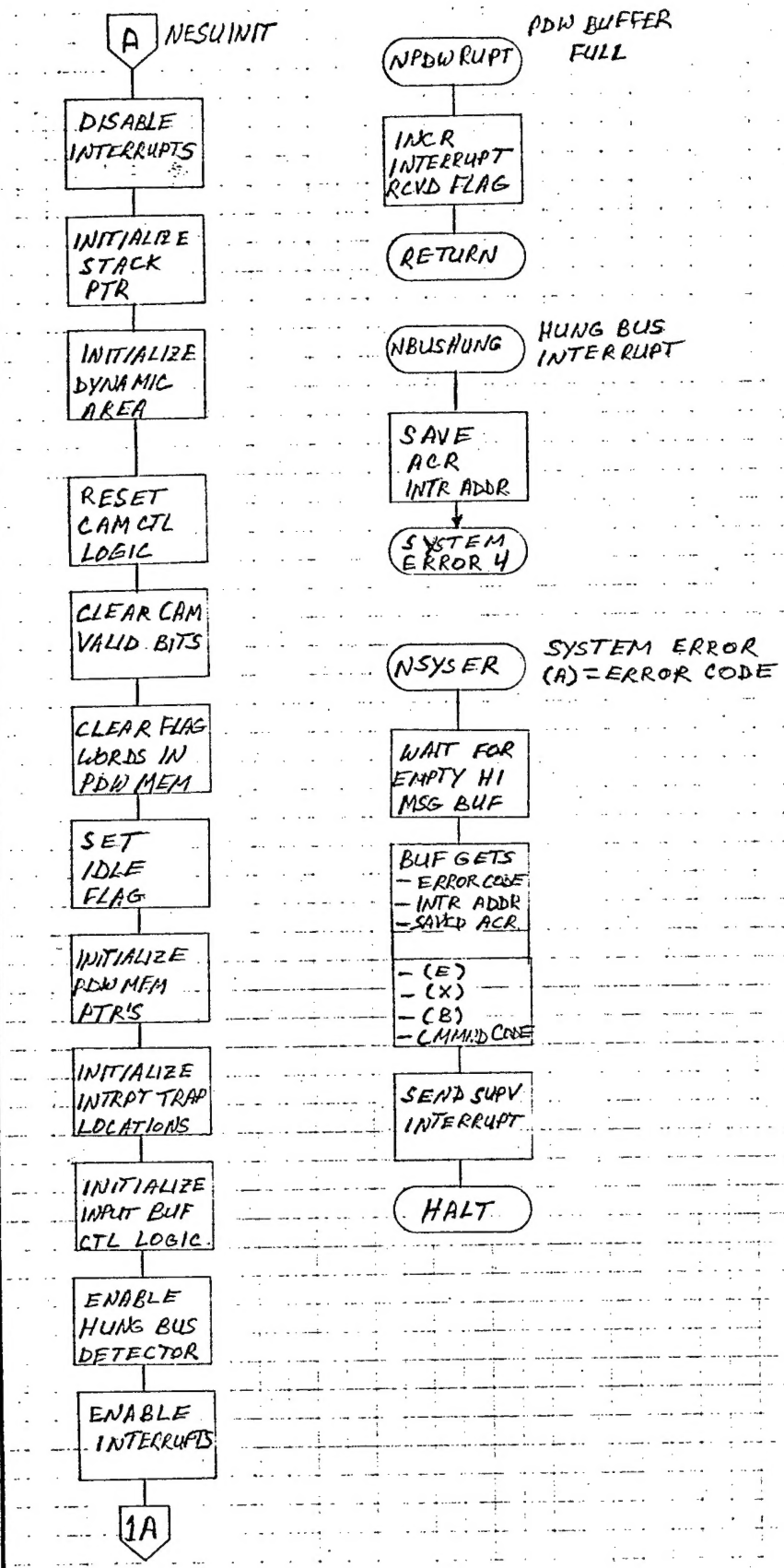
NUMBER SUPV CMND RSPNS | SHEET 17 OF 19

10-2319-18 721

FLOW CHART



REMARKS

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PROGRAM · ROUTINE · SUBROUTINE · ACRONYM
IEWS SORTER-NESU

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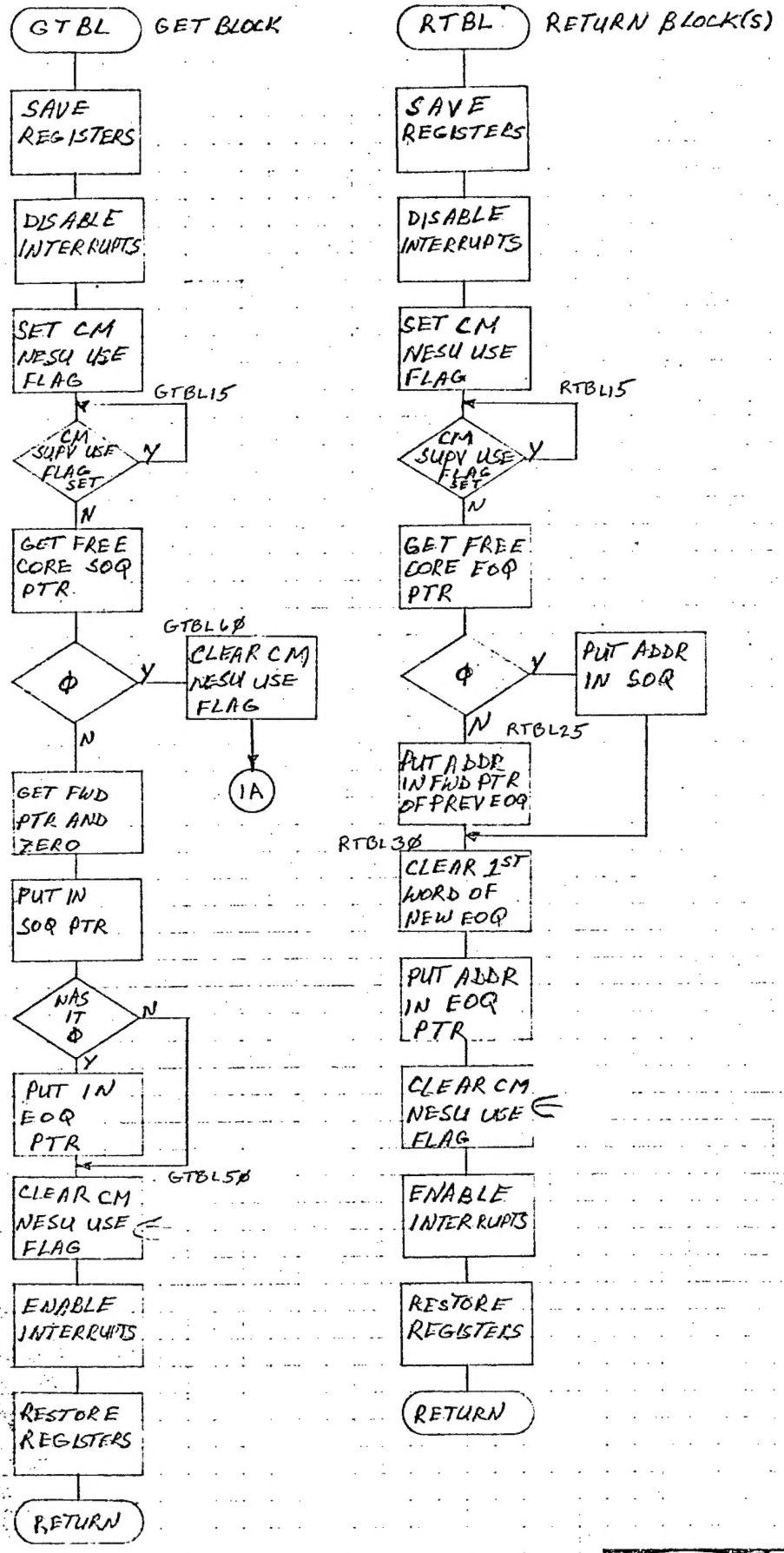
FLOW CHART



REMARKS

CM MEANS CORE MANAGER

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IEWS SORTER - NESU

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